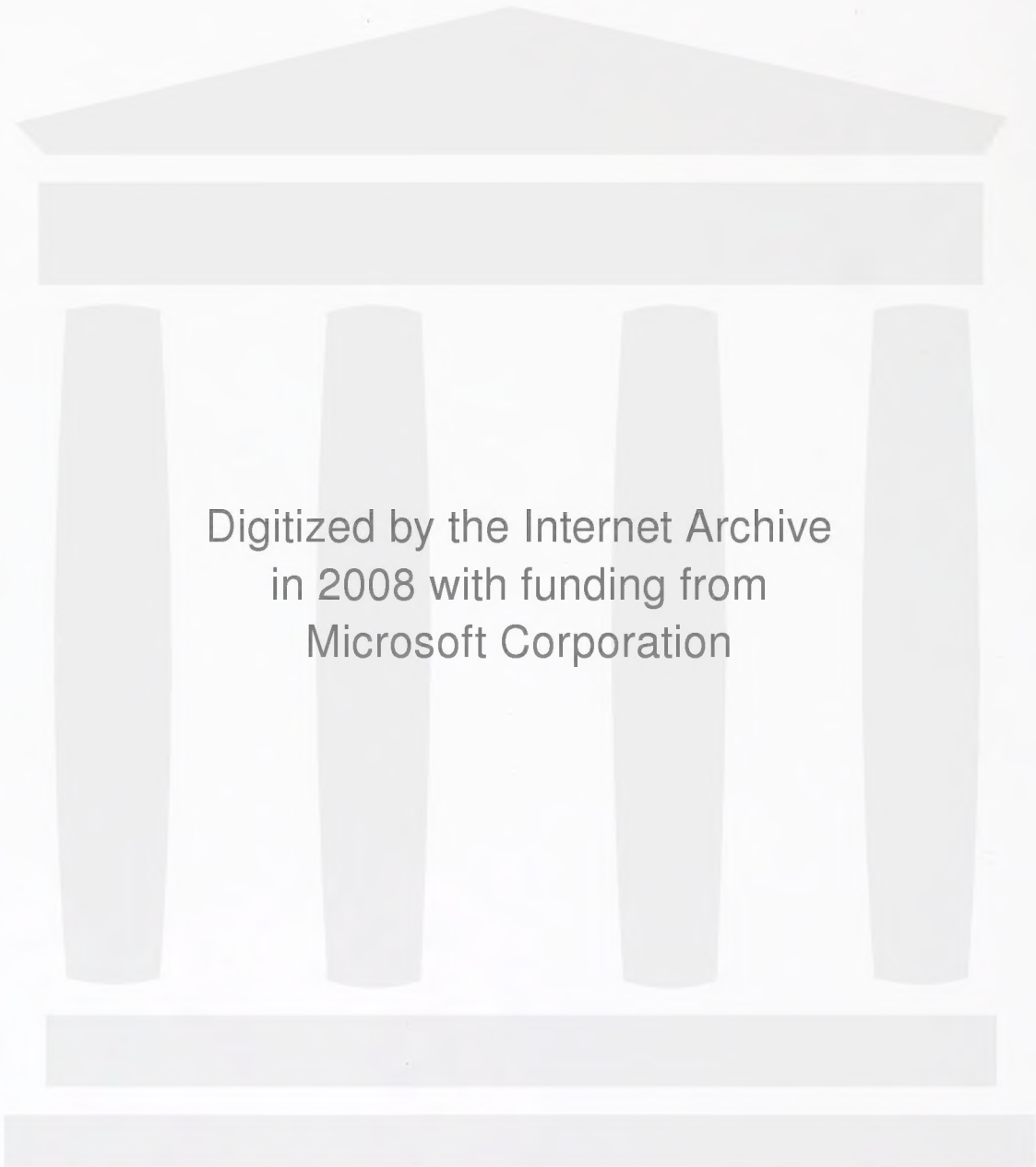
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CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

Vol. XXI. No. 21. Publication Office: Toronto, May 22, 1919. Subscription Price $3.00 per Year

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Our New Montreal Premises in the Heart of the Business District

The A. R. Williams Machinery & Supply Co. Limited

320-328 St. James Street Montreal, P.Q.

Another link in the chain of our organizations at

HALIFAX ST. JOHN TORONTO WINNIPEG VANCOUVER

and BUFFALO, N.Y.

Machine Tools, Woodworking Machinery, Boiler Shop Equipment, Power Plants of every description, Contractors' Machinery and Equipment, Garage Equipment, Boilers and Engines, Gas and Gasoline Engines, Electric Motors and Generators, Machine Shop, Power House and Factory Equipment and Supplies.

If It's Machinery---Write "Williams"

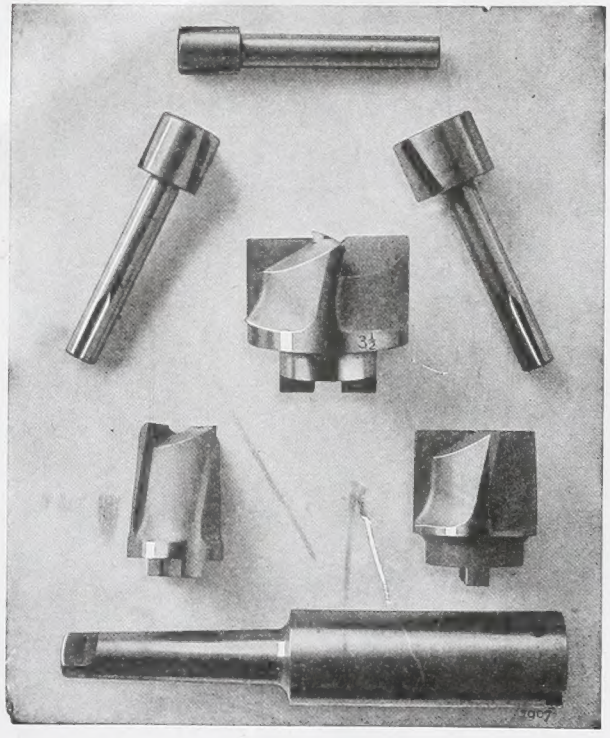
Canada's Leading Machinery House

SMALL TOOLS

Equip Your Tool Room With

PRATT & WHITNEY

Interchangeable Cutter Counterbores



and get the right combination at once.

HOLDER, CUTTER and GUIDE

With this combination you can immediately make the right combination for every counterboring job.

HOLDERS

End of holder is milled to receive the driving lug of the cutter, and there is also a hole and set screw to accommodate the shank of the guides.

GUIDES

Are of hardened tool steel. They are held in place by means of a set screw in the holder engaging a V-slot in the shank of the guide.

CUTTERS

Can be furnished of either carbon or high-speed steel.

The shank of the guide passes through the hole in the cutter and the shoulder between the guide and its shank keeps the cutter in place. Cutters can be sharpened on the face, and the guide is simply pushed further in the hole after grinding.

Holders, Cutters and Guides are furnished in a wide range of sizes.

PROMPT SERVICE

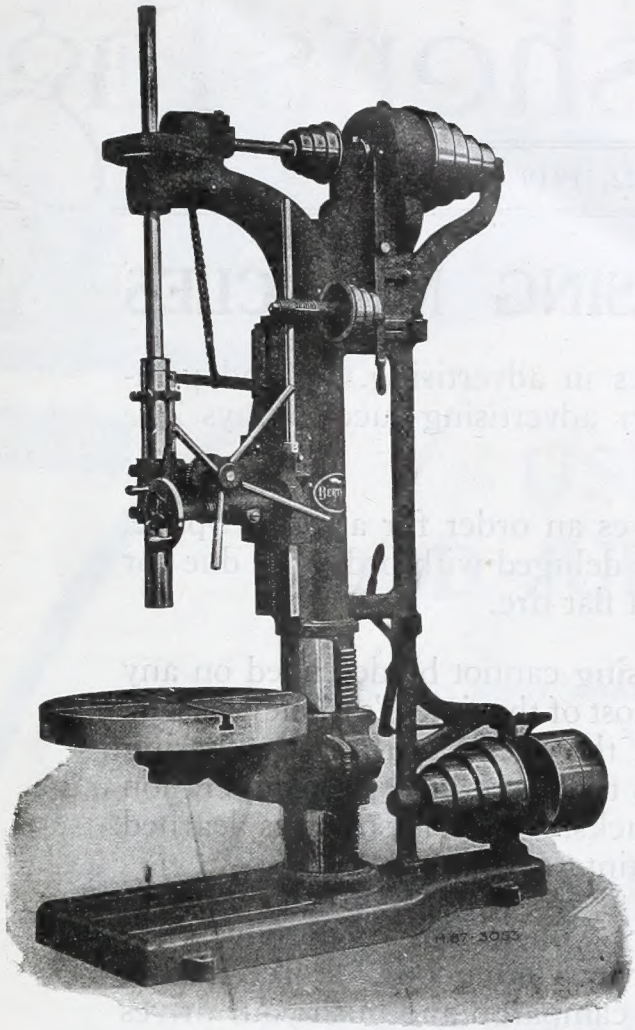
is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg.	1205 McArthur Bldg.	B.C. Equipment Co.



Bertram MACHINE TOOLS

Locomotive and Car Shop Equipment

Structural and Bridge Shop Machinery

Repair Shop Machinery

General Machine Shop Equipment

30-Inch Vertical Drilling Machine

Photographs and full particulars gladly mailed upon request.

WRITE US NOW

We'll be pleased to submit photographs and full details on any line or lines in which you are interested.

The John Bertram & Sons Co., Limited

DUNDAS, ONTARIO, CANADA

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

TORONTO MAY 22, 1919

NO ADVERTISING MIRACLES

THERE are no miracles in advertising. Sound principles are back of every advertising success, says *The Scalpel.*

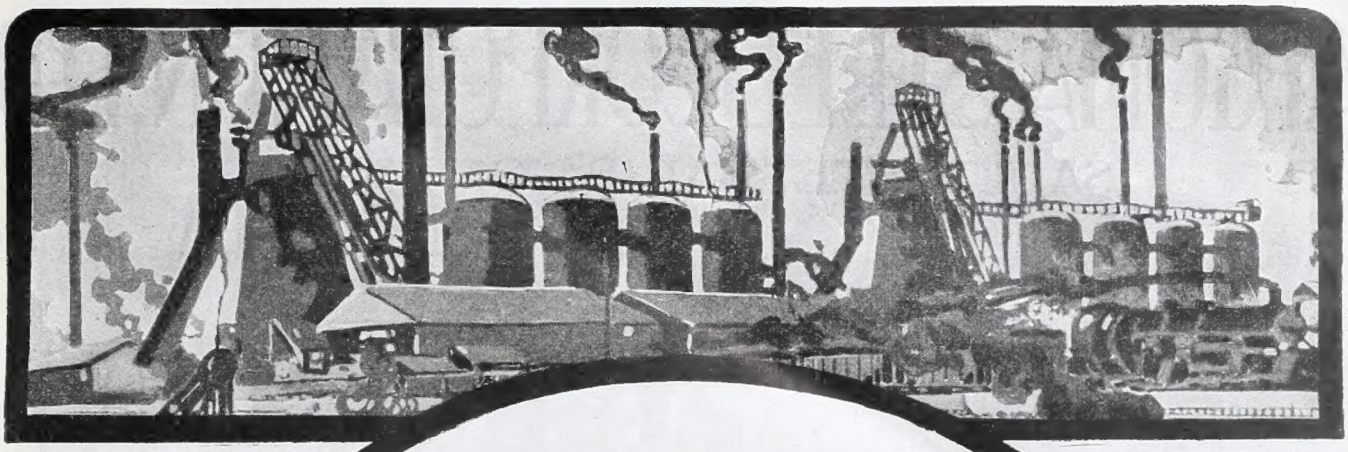
The advertiser who gives an order for a quarter-page, one time, and expects to be deluged with orders, is due for a bump. He is riding on a flat tire.

Single insertion advertising cannot be defended on any sound advertising basis. Most of the time it's money wasted. Marshal Foch confounded the enemy with a bewildering series of consecutive drives that permitted no recuperation nor organized counter-attacks. This lesson was learned after three years of uncertainty and defeat.

Advertising victories are won in this way. Give your prospects no chance to forget your goods. Force him to capitulate. Organize your campaign and push your drives with no interruption. Hammer away with direct mailing, backed by your display advertising. Display space is your heavy artillery, preceding and protecting your infantry or direct attack, either by mail or salesmen or both. Don't send your detail men over the top without machine gun (direct by mail) and heavy artillery (display space) support.

Back up the trade with service and supplies. This is your S.O.S. Department. Detail your men in the field to air scout duty in observing and reporting the effect of your promotion, on distribution, dealer interest and general demand. Have your men in the field follow up your inquiries personally whenever possible. If this is not consistent, put your inquiries in an incubator and keep them warm with gentle follow-ups. Nurse them along when they show signs of hatching, and don't, for a minute, treat them like so many scraps of paper. Once they get chilled with inattention, delay or careless handling, the stuff is all off. You can't bring them back to life.

Canadian Machinery and Manufacturing News, May 22nd, 1919. Vol. 21, No. 21. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3.00; United States, $3.50. Entered as second-class matter at the Post Office Department, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.



Quality

Service

USE GOOD JUDGMENT

And contribute your share to the prosperity
of the Country in which you live.
Spend your money where you earn it.

PURCHASE THE PRODUCTS OF CANADIAN MILLS

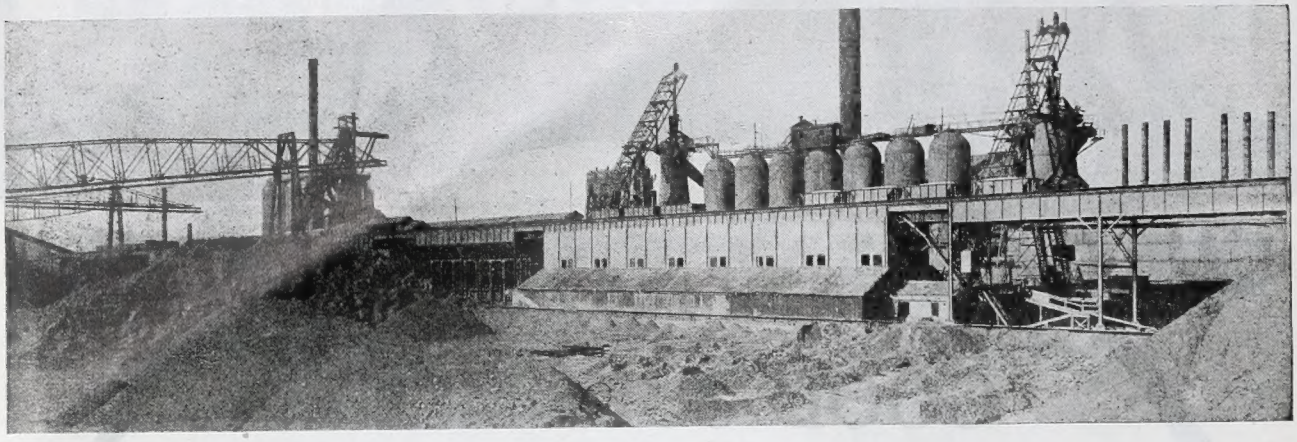
A Canadian Dollar
is Worth One Hundred Cents
in Canada

THE
STEEL COMPANY
OF
CANADA
LIMITED

HAMILTON ▪ ▪ MONTREAL

ALGOMA STEEL CORPORATION, LTD.

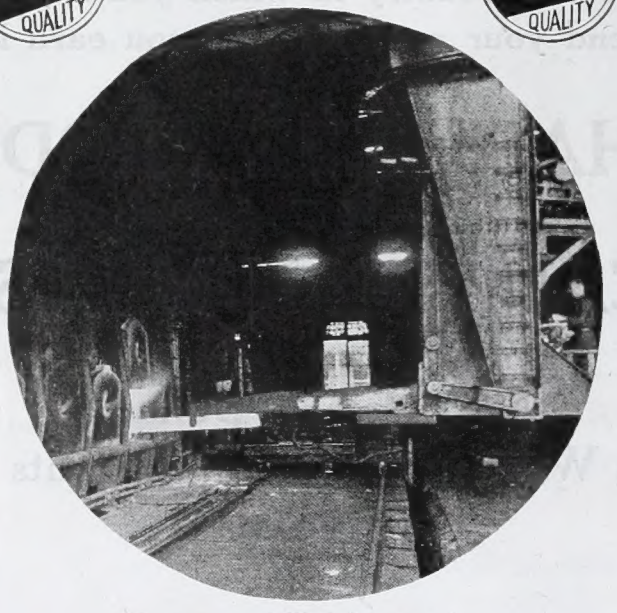
SAULT STE. MARIE, ONTARIO



BLOOMS,
BILLETS,
SLABS,
STRUCTURAL
STEEL
MERCHANT
BARS
CONCRETE
REINFORCING
BARS
IRON, BRASS
AND BRONZE
CASTINGS

MARK OF ALGOMA OH QUALITY

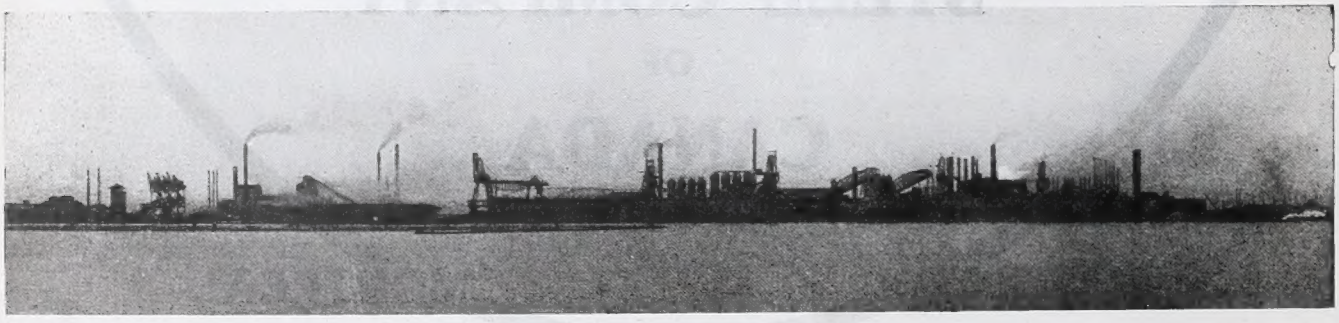
MARK OF ALGOMA OH QUALITY



Charging and Withdrawing Crane

Sulphuric Acid. Nitre Cake

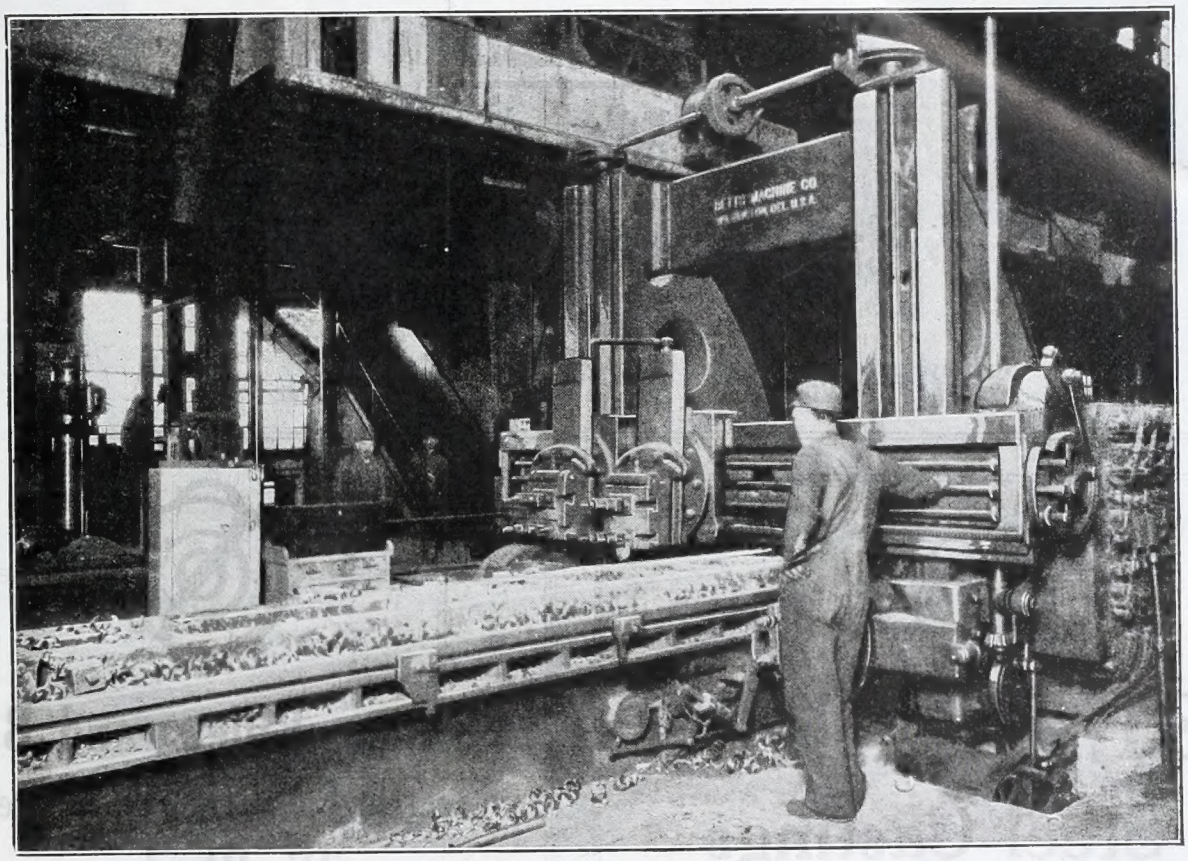
STEEL
RAILS
Open Hearth Quality
(All Sections from 12 lbs
to 100 lbs per yard)
SPLICE
BARS
STEEL
TIE PLATES
PIG IRON
BASIC, FOUNDRY-
BESSEMER
SULPHATE OF
AMMONIA



GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORAT ION FROM THE WATERFRONT

BETTS

Taking Two Cuts 1 Inch Deep with 1/4 Inch Feed in High Carbon Steel



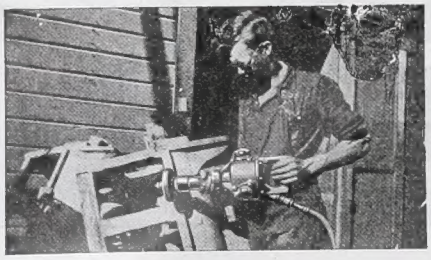
Planing steel trailer frames, taking two 1-in. cuts with ¼-in. feed at a cutting speed of 30 feet per minute in tough high carbon steel, would strain or break down an ordinary planer.

This Betts Planer in one of the leading locomotive works takes cuts like these as a matter of routine and is running night and day without trouble or repairs.

Service like this is possible on a Betts because of their exceedingly heavy construction—steel gearing throughout—steel rack—bronze bushings—extra heavy cross rails and uprights—heavy box type table and other features of the Betts standard of world leadership.

When you think of planers, think of Betts Planers.
Specifications, quotations, etc., on request.

BETTS MACHINE CO.
408 Blossom Rd. Rochester, N.Y.
Formerly of WILMINGTON. DEL.



"LITTLE DAVID"

GRINDER

Useful in the Foundry

Canadian Ingersoll-Rand Company
Limited

Sydney Sherbrooke Montreal Toronto Cobalt
Winnipeg Nelson Vancouver

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ELECTRIC

Steel Castings

High Grade STEEL Castings
Of Every Description

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Send us your drawings
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COMPANY, LIMITED
WELLAND ONTARIO

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Forging Billets and Bars
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Die Blocks
Annealed—Heat Treated

Piston Rods
Rough Turned—Annealed—Heat
Treated

High Speed Steel

General Steel Company
Milwaukee, Wisconsin
DETROIT—823 Dime Bank Building

WILT

HIGH SPEED AND CARBON
TWIST DRILLS
REAMERS AND MILLING CUTTERS

Quality First

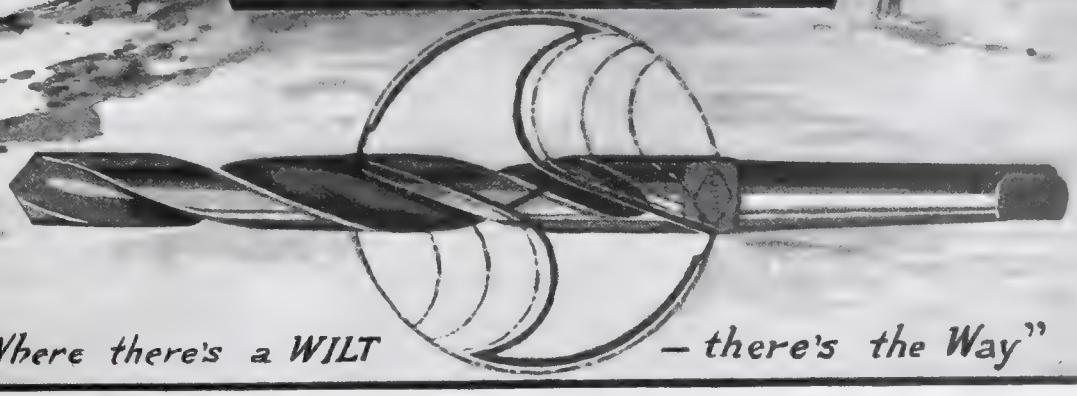
The Keystone Upon Which All WILT Products Are Built

A high standard of perfection is maintained throughout the various processes of manufacturing WILT High Speed and Carbon Twist Drills, Reamers and Milling Cutters. WILT products improve production! This is no theory, no untested statement, but an established fact backed by many of the largest manufacturers throughout Canada. For steady, reliable output of work that is satisfactory from the standpoint both of quantity and quality there is no better choice than WILT Products.

Put them to the Test.

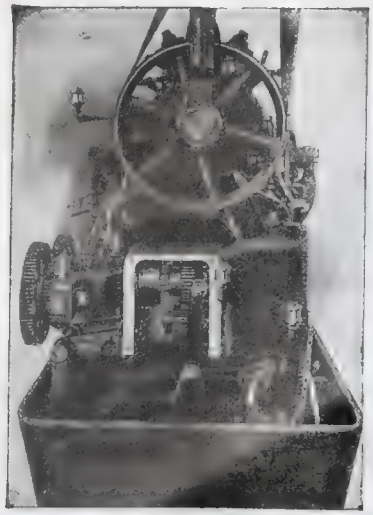
WILT TWIST DRILL COMPANY
OF CANADA, LTD. WALKERVILLE, ONT.

London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C 2, England.



"Where there's a WILT — there's the Way"

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.



Courtesy National Acme Co., Cleveland, Ohio.

WATCH

is subject to exceptional hard usage, but it gives unfailing service.

YOUR MACHINE

should be equipped with clutches that will give just such satisfaction.

What are your requirements? Let us know. We maintain an engineering force to work out all clutch installations. They will co-operate with you.

Write for our Yellow Data Sheets and Booklet, "Clutches as Applied in Machine Building"

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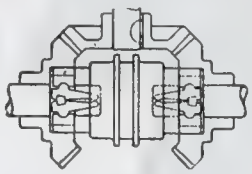


Double Clutch in Nest of Gears

THE JOHNSON FRICTION CLUTCH

Coal
Coke
Iron Ore

Pig Iron

Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M.A. HANNA & CO.

Sales Agents:
CLEVELAND
Canadian Office:
904 C.P.R. Bldg., Toronto

FIRTH'S Speedicut HIGH SPEED Steel

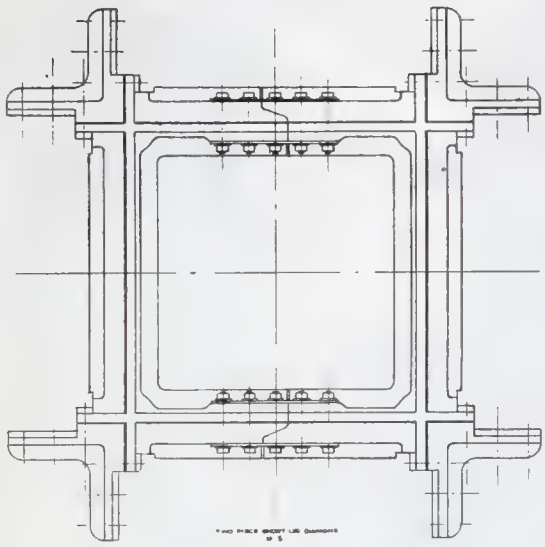
Insures Maximum Production

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES { 449 St. Paul St. West, MONTREAL
79 West Adelaide St., TORONTO

J. A. SHERWOOD
Canadian Manager



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for Steam & Electric Railways

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COMPLETE INTERSECTIONS

Built-up, Hard-Centre or Solid Manganese-Steel Construction

Manufacturers of Balkwill Articulated Cast Manganese Crossings.

CANADIAN STEEL FOUNDRIES, LIMITED

Transportation Building. Montreal

Electrite

Electric furnaces, automatically regulated, the most modern methods, and the **introduction of Uranium** — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE
ELECTRIC STEEL CO.
LATROBE, PA.

High Speed Steel

Uranium

LOCOMOTIVE AND CAR WHEEL TYRES

HIGH-SPEED AND CARBON TOOL STEEL

MISCELLANEOUS SHOP TOOLS

MADE IN CANADA

ARMSTRONG WHITWORTH
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Montreal

Works :
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Branches :

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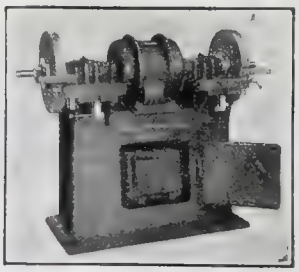
FORD-SMITH Grinders

A fine example of high grade material and workmanship

General Purpose Grinder

Water Tool Grinder

FOREIGN AGENTS:
W. E. Storey, 3 Arundel St., London, Eng. Alf. Herbert, Limited, 54 Dey St., New York, U.S.A.



Motor Driven Floor Grinder

Motor-Driven Grinders
Floor Grinders
Bench Grinders
Water Tool Grinders
Swing Grinders
Disc Grinders
Special Grinding Machinery
Hack Saws
Swivel Tables

Write for Catalogue and price list.

The Ford-Smith Machine Co., Ltd.

HAMILTON - ONTARIO

IMPERIAL GENUINE BABBITT METAL

The Highest Grade Manufactured

Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by
THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg, Vancouver

HOYT METALS

"Frost King"
"Trojan"
"Nickle Genuine"
BABBITTS

Hoyt Metals have been used with great success for many years.
Put them to the test and you'll soon see a difference in your babbitt cost.
All elements entering into our mixtures are carefully refined and put together in such proportions and in such relation to each other that the best possible alloy is secured for the work for which it is designed.

Annual sales over $5,000,000.

Hoyt Metal Co., Toronto

New York, N.Y. London, Eng. St. Louis, Mo.

STEEL *for*

Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

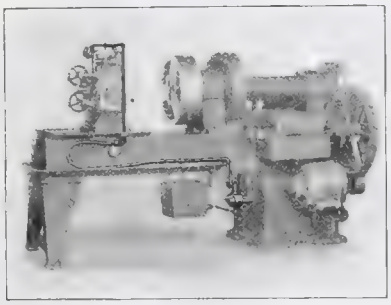
We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

Nova Scotia Steel and Coal Co., Limited

Head Offices:
New Glasgow, N.S.

Western Sales Offices:
Room 14 Windsor Hotel
MONTREAL

Steel Ingots
by the
HARMET
Liquid Process



Massive Pipe Threading Machine
is equipped with
TRAHERN Lubricating Pump

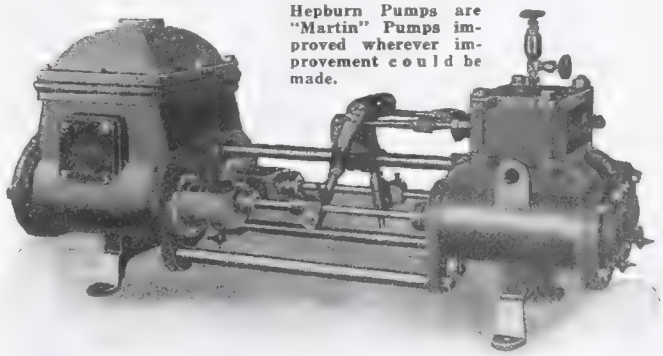
The Merrill Mfg. Company recognizes the increased efficiency of their product when equipped with good lubricating pumps.
They have tried TRAHERN Pumps and know they can be relied on to throw an unceasing stream of coolant over their dies. Throughout the world TRAHERN Pumps are gaining an enviable reputation. Customers everywhere are thoroughly satisfied with them.
We know that you would be as thoroughly satisfied with TRAHERN Pumps as they are. Will you give them a chance to prove their worth?

TRAHERN PUMP COMPANY
ROCKFORD, ILLINOIS
Canadian Agents:
A. R. Williams Machinery Co.
Toronto, Ont., Canada

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.



JOHN T. HEPBURN, LIMITED
18-60 Van Horne Street Toronto, Ontario

WAR is destructive. Peace is constructive. War has taught us many things, chief of which is the great value of Time. Time is the essence of your life and mine. Whatever saves Time, saves Life.

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

Is the avowed Enemy of Waste and Inefficiency, and allied with Life. Save Time, Save Life

Are your Tools made of Red Cut?

VANADIUM-ALLOYS STEEL CO.

General Sales Offices, PITTSBURGH, PA.
Works, LATROBE, PA.

BOSTON
BUFFALO
CINCINNATI
CHICAGO
CLEVELAND
DETROIT
PITTSBURGH
MONTREAL
NEW YORK
TORONTO

Swedish Steel & Importing Co., Limited

Montreal
New York
Toronto
Denver

Direct representatives of foremost Swedish mills: makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS DOUBLE ESS

PROMPT SHIPMENTS from large stock

WOLFRA

MADE IN THE U.S.A.

HIGH SPEED STEEL TRADE MARK

A Keen Cutter

WOLFRAM Is Both

VULCAN CRUCIBLE STEEL CO. Aliquippa ESTABLISHED 1900 Pa: U.S.A.

Represented in Canada by Messrs Norton Callard & Company MONTREAL QUE.

Strong in the Neck

CANADA
FOUNDRIES & FORGINGS
LIMITED

A SOLEMN WARNING

A flood of business will overwhelm this country inside of two months. Problems of supply must be met and faced squarely. Those firms who have courage are getting their supplies now. Those who are hesitating are going to receive an awful jolt when they finally decide to proceed with business, because it will be impossible to get service. They will then blame everybody but themselves. Our solemn warning is, "Don't blame us because you didn't see this vision."

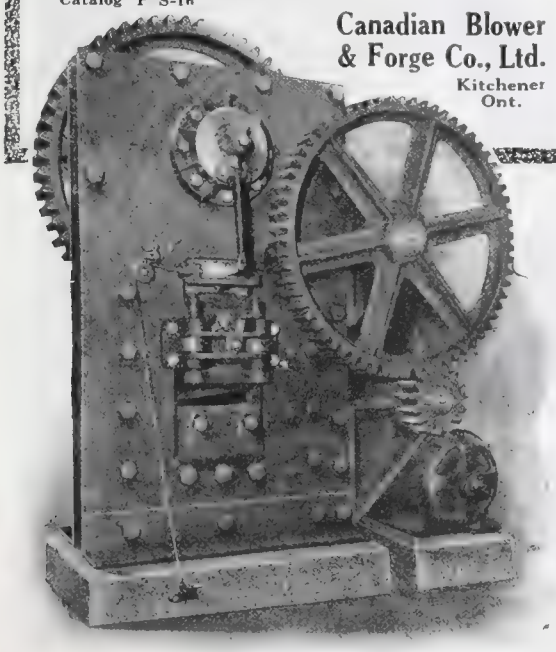
Canada Foundries & Forgings, Limited
WELLAND, ONT.

CANADIAN ARMOR PLATE

PUNCHES, SLITTING SHEARS, and BAR CUTTERS are dependable. They are built of "Armor Plate" steel—tensile strength 75000 lbs. per square inch—7½ times as strong as cast iron.

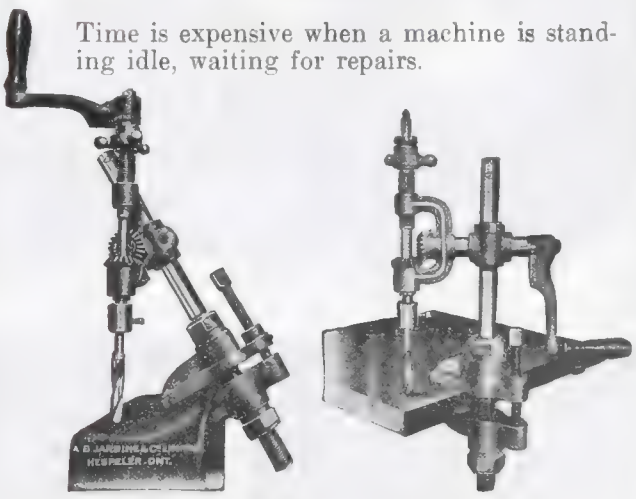
That means a lighter and stronger machine—a machine built to take a lot of punishment. **Write for Catalog P/S-16**

Canadian Blower & Forge Co., Ltd.
Kitchener Ont.



Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net
Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO

"THE RACINE"

High Speed Metal Cutting Machine

Standard the World Over

This is the only machine in the World that has an ABSOLUTELY POSITIVE AUTOMATIC LIFTING DEVICE, a feature secured by patents. Another feature is the rigid saw frame guide. These two assets combine to give long life to the cutting blades and save a lot of money.

"THE RACINE" minimizes wastage, cuts accurately and with great speed. Then they are easy and cheap to operate. These features are appreciated by the best shops everywhere and that's why "THE RACINE" sets the "Standard the World Over." Write for full particulars.

Use "RACINE" H. S. Tungsten-Power Blades.

RACINE TOOL & MACHINE COMPANY

Melbourne Ave. ∴ RACINE, WIS., U.S.A.

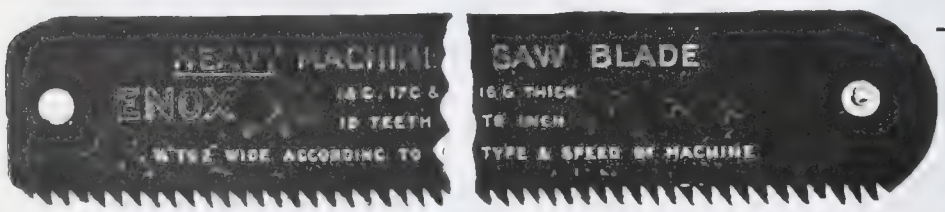
SIMONDS

HACK SAW BLADES

UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited

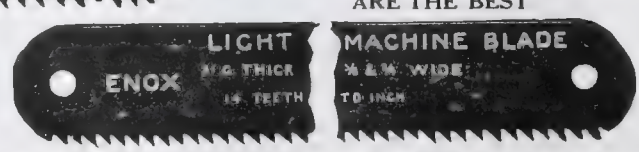
ST. JOHN MONTREAL VANCOUVER



ENOX

Hacksaw Blades

ARE THE BEST



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Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Makers:

FRY'S (LONDON) LIMITED

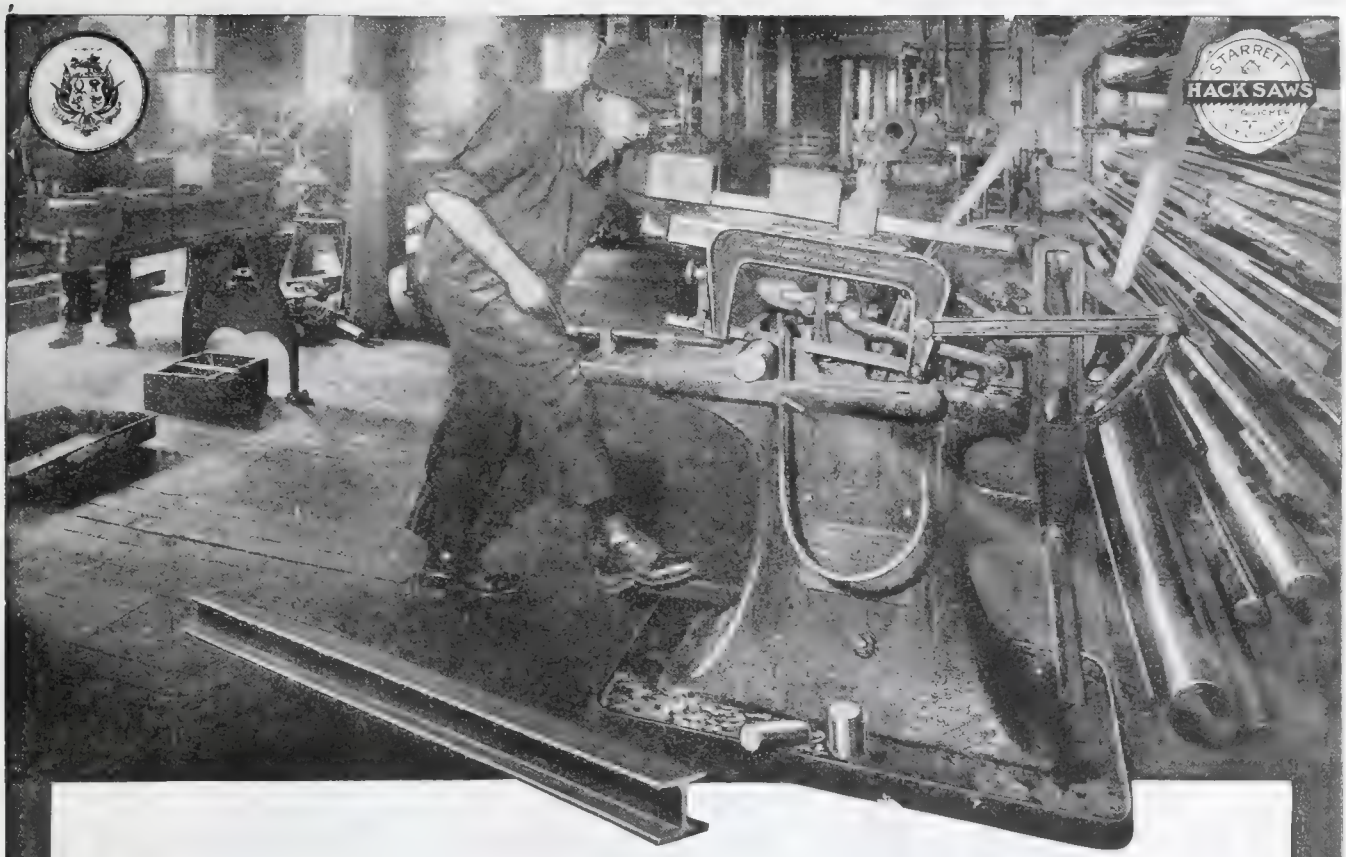
AN ENTIRELY BRITISH COMPANY

46 Upper Thames St., London, E.C. 4, England. Works: Greenwich, S.E. 10

Agents for Canada, East of Fort William

THE STANDARD MACHINERY & SUPPLIES, LIMITED, 261 Notre Dame St. West, MONTREAL, QUE.

Agents for British Columbia—The A. R. Williams Machinery Co., Limited, 495 Railway St., Vancouver, B.C.



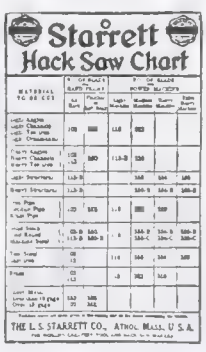
CHOOSE YOUR BLADE TO FIT YOUR WORK

If you've been cutting 3″ round machine steel with a heavy gage, coarse blade and find your next job is on structural beams—7″ I-beams for instance—it's cheaper to change to a blade designed for that class of work than to keep on with the coarse blade you used on round stock.

If you use the same blade on both jobs, all the weight and strain of cutting the I-beam at any period in the cut must be borne by a smaller number of teeth than were engaged at any single instant on the round stock. The fewer the teeth that are cutting at any given time, the sooner they will become dull and the greater likelihood there is of their stripping.

That's the reason why the Starrett Hack Saw Chart recommends different kinds and shapes of metal. In this case, our tests show that a blade with more teeth to the inch should be used on structural steel than on round stock.

Follow the Starrett Hack Saw Chart 3 and watch your cutting cost go down.



THE L. S. STARRETT COMPANY, Athol, Mass.

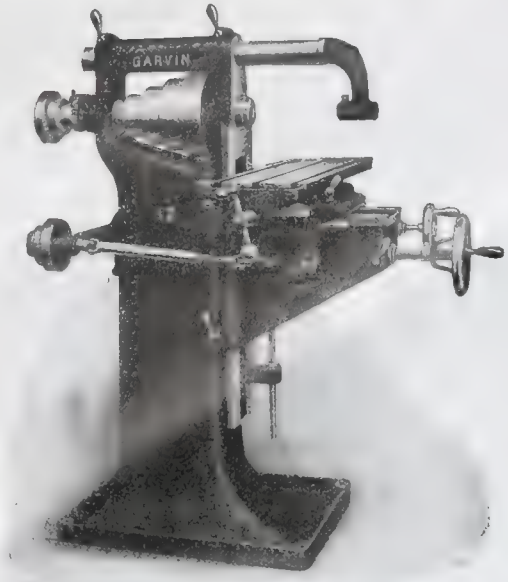
The World's Greatest Toolmakers
Manufacturers of Hack Saws Unexcelled

New York London Chicago

2-93

Starrett Hack Saws

GARVIN



No. 12 Plain Milling Machine-Use Code Abrade

NO. 12 PLAIN MILLING MACHINE

FOR ALL LIGHT MANUFACTURING

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rigidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments .....18 x 6 x 15 in.

For Further Information ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

Send for Complete Catalog

Manufactured by

THE GARVIN MACHINE COMPANY

Spring and Varick Streets (*Visitors Welcome*) 50 Years New York City

"The Marshalltown Throatless Shears"

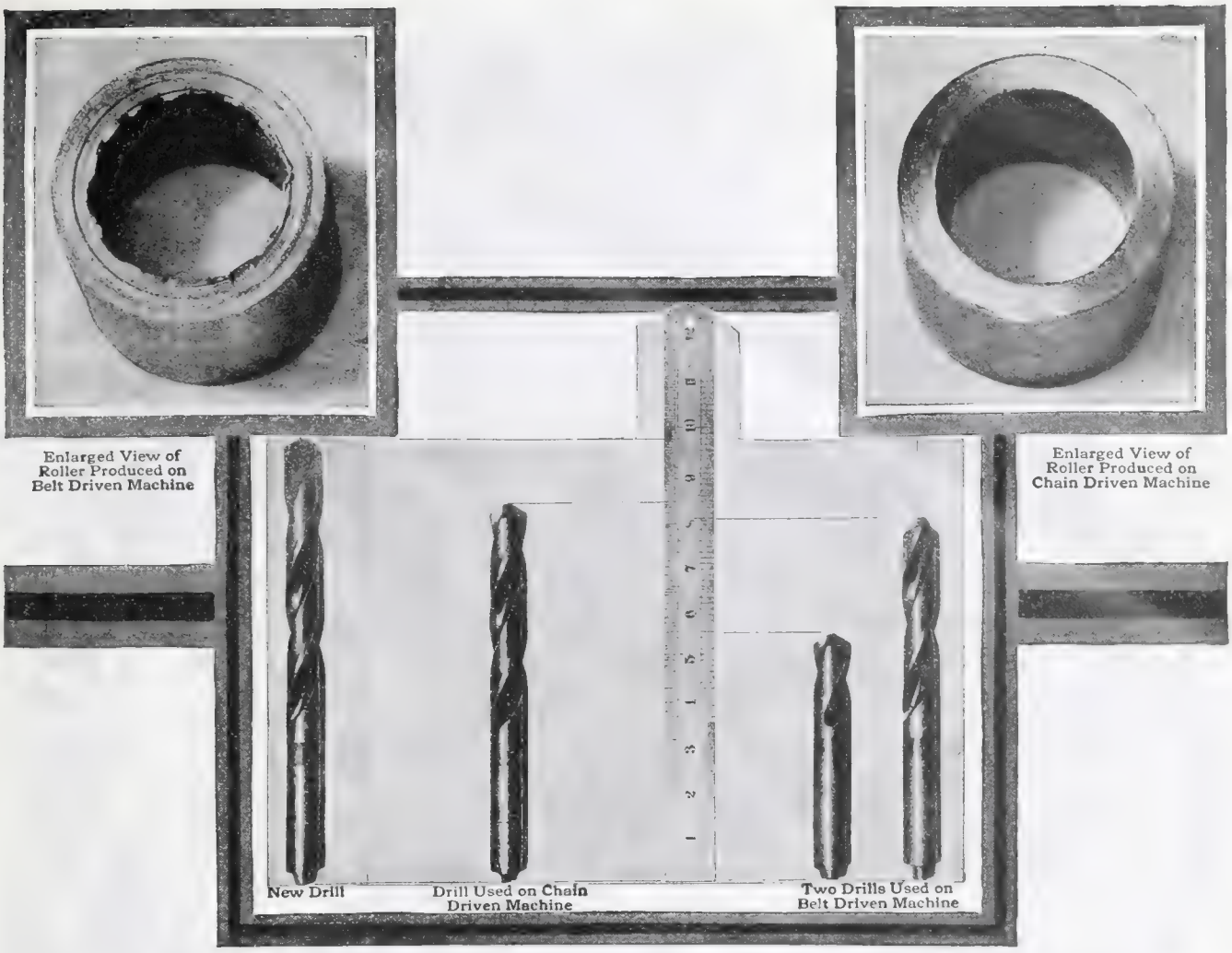
guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.

Marshalltown, Iowa
U. S. A.


Enlarged View of Roller Produced on Belt Driven Machine
Enlarged View of Roller Produced on Chain Driven Machine
New Drill
Drill Used on Chain Driven Machine
Two Drills Used on Belt Driven Machine

23% Greater Output—50% Less Tools

IN all of our advertising we have told you that Link-Belt Silent Chain Drives increase output and reduce production costs.

Here's a concrete example.

A belt driven automatic screw machine was used for cutting off small rollers. The enlarged illustration in the upper left hand corner shows the class of work produced.

Later this machine was driven with Link-Belt Silent Chain. The enlarged illustration in the right hand corner shows the class of work produced after the change was made.

Two drill presses running at the same speed were used in drilling these rollers. One was belt driven—the other was driven with Link-Belt Silent Chain. Both were run 138 hours drilling the same class of material with the same class of drills.

The chain driven machine turned out 3074 rollers. The belt driven machine produced 2485 rollers. The chain driven machine did the work with one drill. The belt driven machine required two. The chain driven drill was sharpened twice. The belt driven drill was sharpened ten times.

The chain driven drill press produced 23% more work—used one drill instead of two and did an infinitely superior class of work.

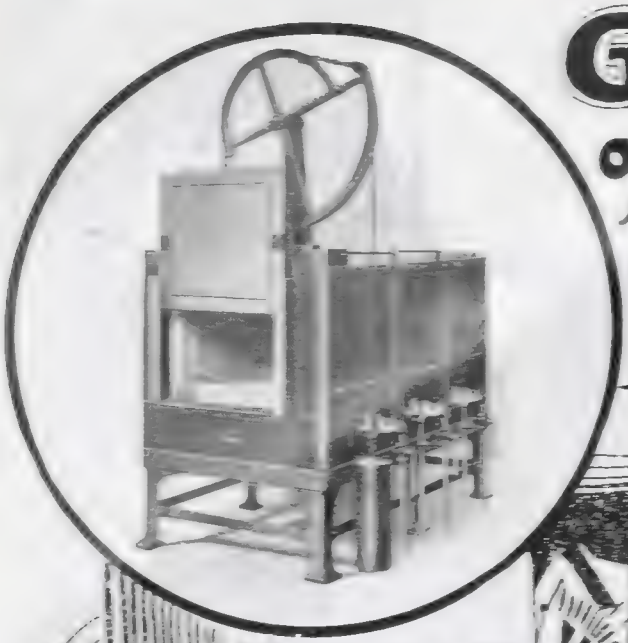
Our Machine Tool Drive Book No. 312 tells why. Send for a copy.

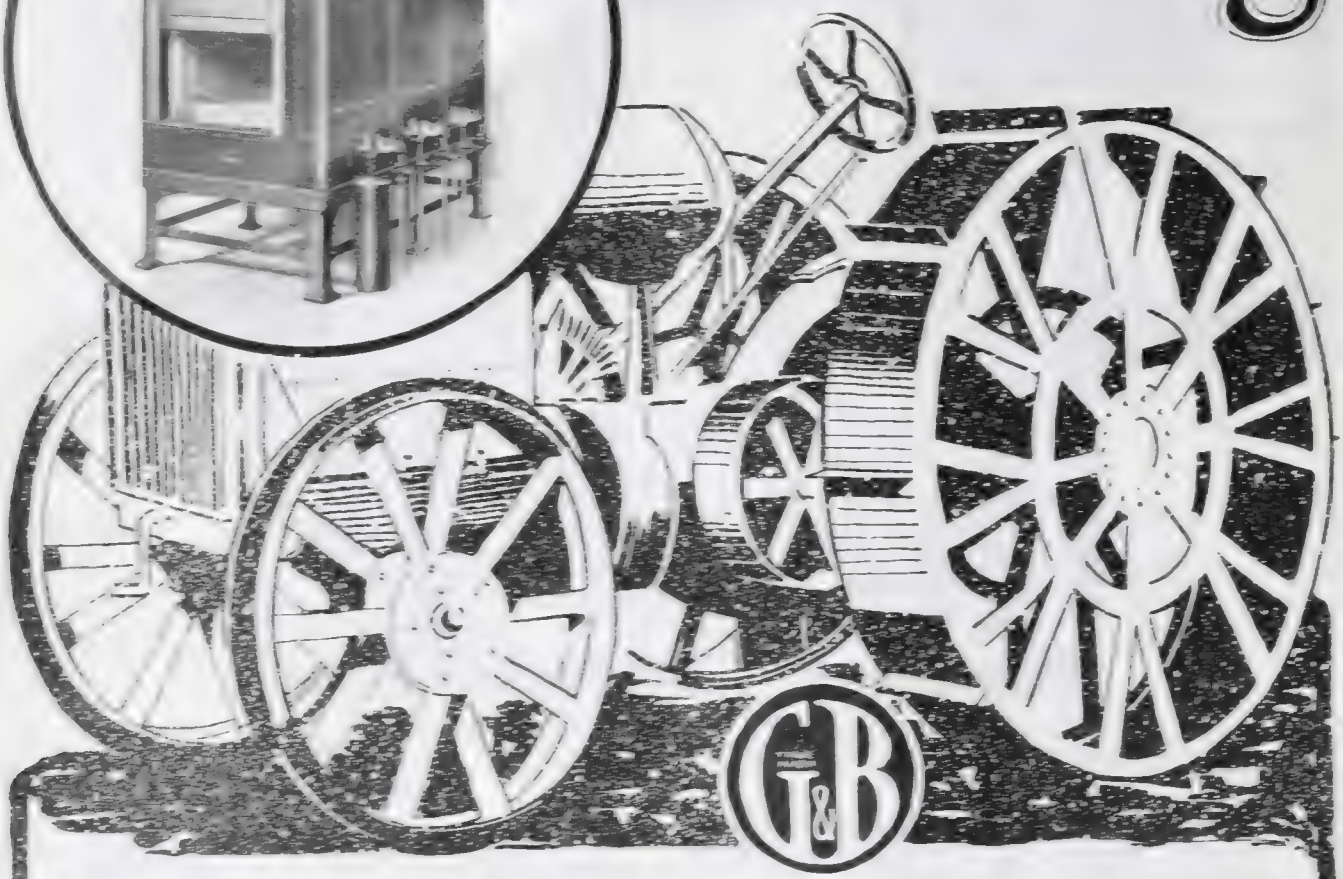
CANADIAN LINK-BELT CO., LTD.

Wellington and Peter Sts., Toronto

LINK-BELT
SILENT CHAIN DRIVES

G&B Method of Heat-Treating





Gilbert & Barker Method the Right Method of Heat-Treating

Used by the Largest Manufacturers of Autos and Trucks.

Whenever you manufacture tractors—automobiles—trucks—crankshafts—camshafts—gears—machine parts or anything else that requires heat-treating unless you have the right kind of heat-treating furnace for the purpose, you are defeating your own purpose. Instead of turning out a first-class product of uniform high quality,

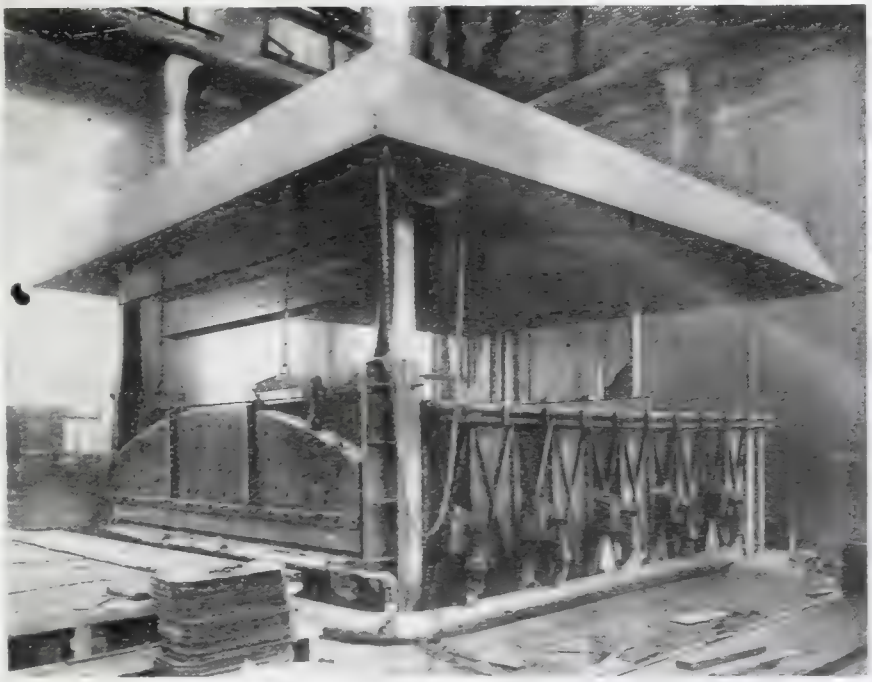
GILBERT & BARKER FURNACES INSURE
PERFECT COMBUSTION—ABSOLUTE TEMPERATURE CONTROL
UNIFORMITY OF HEAT

the result of which is an exceptionally high grade product which measures up to the best manufacturing standards. There is a G. & B. Furnace exactly suited to your requirements. Let our engineers advise you—write. **To-day is a better day than to-morrow to send for Bulletin 24.**

Gilbert & Barker Manufacturing Company

Established 1865 WEST SPRINGFIELD, MASS.

AGENTS



Any Size

Illustration shows a Plate Heating Furnace installed in the plant of Canadian Vickers Ltd., Montreal.

Your proposition, if out of the ordinary, would be bettered by our co-operation. Get in touch with us.

Mechanical Engineering Co., Ltd.

Room 308, Bank of Toronto Bldg., Montreal

Three Rivers, Que., Canada

GENUINE EMERY

Sizes 180, 160, 140, 120, 110, 100, 90, 80, 70, 60, 54, 46 40, 36, 30, 24, 20, 18, 16, 14, 12, 10, 9, 8, hole.

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EMERY GLASS FLINT GARNET CORUNDUM CARBORUNDUM	PAPER AND CLOTH	IN SHEETS, ROLLS, DISCS, BANDS, STRIPS and TAPES, &c.

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Immediate delivery on all tool room types

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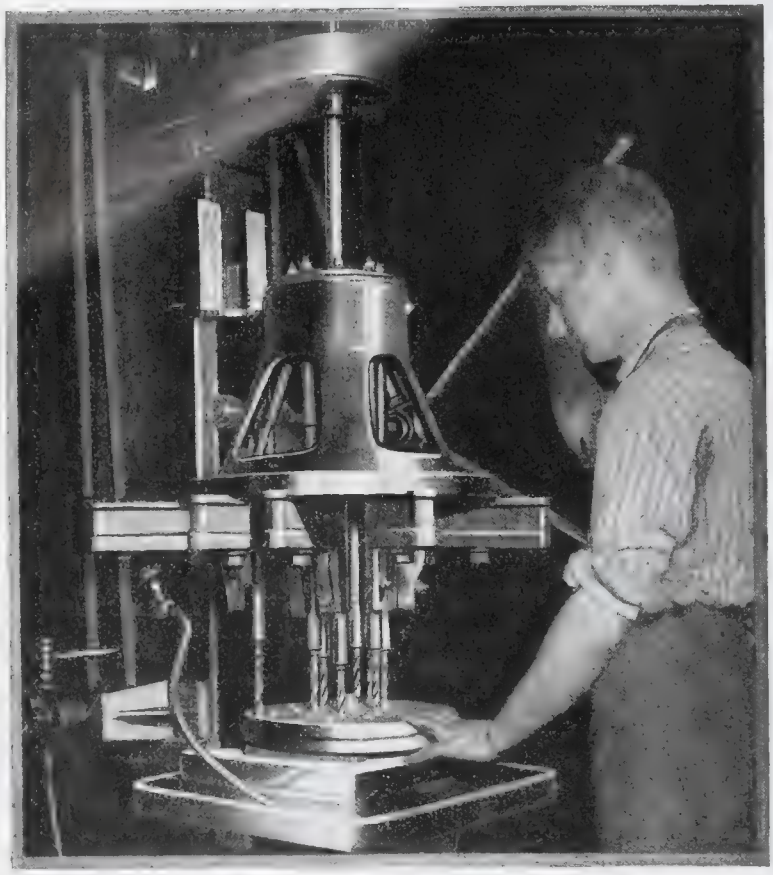
NATCO



Wages are too high to drill one hole at a time—

Do your drilling the Natco way

This Baby NATCO has many jobs at the plant of the H. H. Franklin Mfg. Company, Syracuse, N. Y. — among them the drilling of eight 7-16 in. holes, 5/8 in. deep, in cast iron Fly Wheels for Gas Engines. Production brings cost down to the lowest point.

The NATCO patented one-nut adjustable arm is clearly shown. This provides quick and accurate adjustment of the drill spindle. Total vertical adjustment 2 in. Arms are readily changed for different set-ups.

NATCOS equipped with our patented Independent Change of Speed for each Spindle permit holes of different sizes to be drilled at the same time with each tool at its approximately correct cutting speed. This is an exclusive NATCO feature.

NATCOS are built in eleven standard sizes with a wide range of drilling area and of spindle capacity. We specialize in Multiple Drilling Machinery and will be glad to have you put your drilling problems up to us.

The National Automatic Tool Co.

Richmond, Indiana

List of NATCO foreign Agents:

A. R. Williams Machinery Co., Limited, Toronto, Canada
Burton, Griffiths & Co., British Isles.
E. Isbecque & Co., Belguim.
Allied Machinery Co. of America, Italy, Spain, Portugal and Switzerland.
Aux Forges De Vulcain, France.

Tycos

TEMPERATURE INSTRUMENTS

Indicating Recording Controlling

This General Trade Mark

REGD. TRADE MARK Tycos ROCHESTER, N.Y.

covers all indicating, recording and controlling instruments made by this company and is a synonym for standard apparatus—precision, reliability and permanence.

We invite, from all interested industrial managers, correspondence relating to our instruments and their uses.

Our stock models cover every usual industrial requirement, with very moderate outlay.

Taylor Instrument Companies

Rochester, N. Y.

There's a Tycos or Taylor Thermometer for Every Purpose

201 Royal Bank Bldg., Toronto

Cuts Costs Increases Production ---*it is a Rockford Machine*

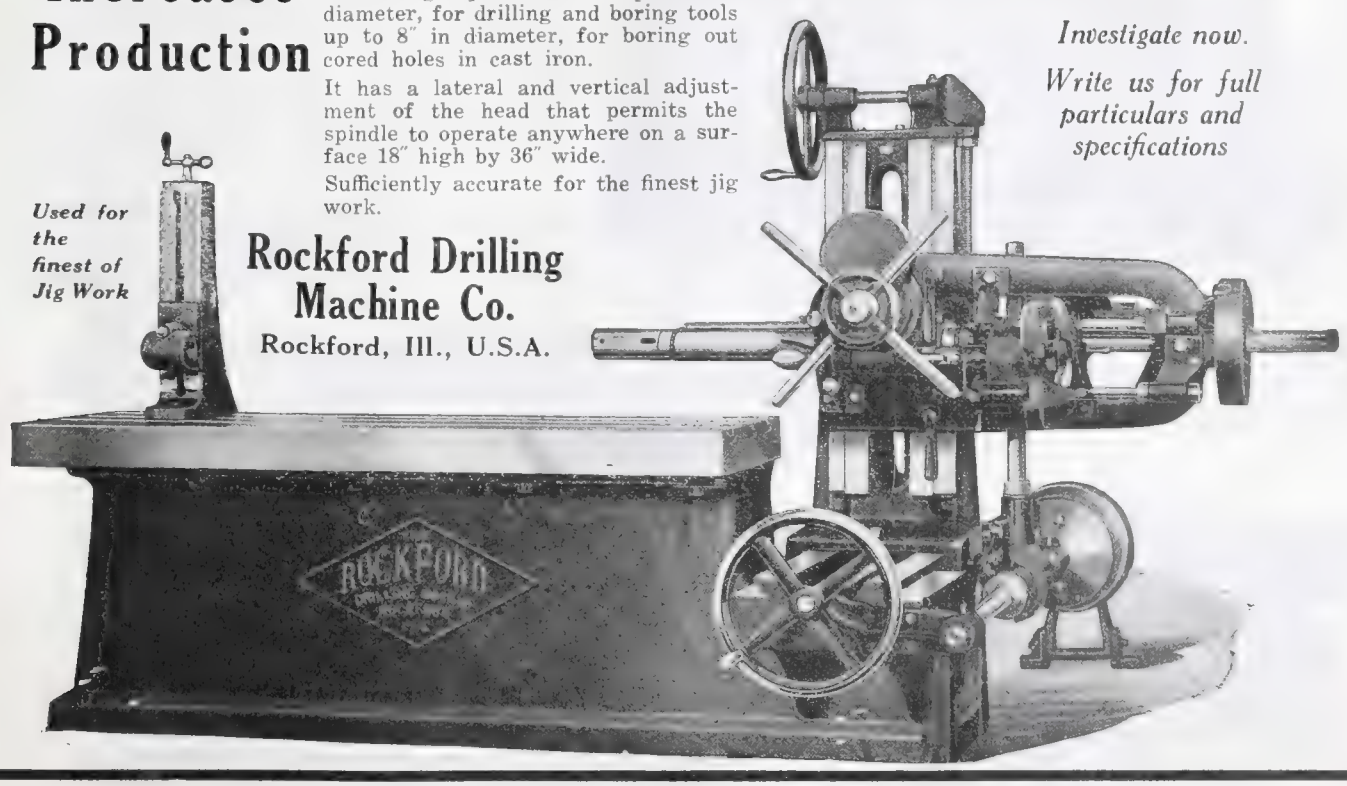
This powerful machine is made to drive high-speed drills up to 3″ diameter, for drilling and boring tools up to 8″ in diameter, for boring out cored holes in cast iron.

It has a lateral and vertical adjustment of the head that permits the spindle to operate anywhere on a surface 18″ high by 36″ wide.

Sufficiently accurate for the finest jig work.

Investigate now.

Write us for full particulars and specifications

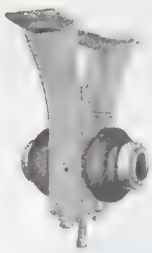


Used for the finest of Jig Work

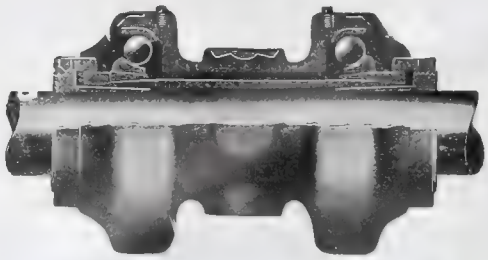
Rockford Drilling Machine Co.

Rockford, Ill., U.S.A.

MADE IN CANADA



Friction Practically Eliminated



Lubrication required only once or twice a year

There's a Good Reason

When such firms as Pierce Arrow Motor Co., Ford Motor Co., Bethlehem Steel Co., International Harvester Co., Fairbanks-Morse Co., Goodyear Tire & Rubber Co., and 3,000 other plants installed **Chapman Ball Bearings** for their transmission machinery they did so for one good reason—because **Chapman Ball Bearings** eliminate friction and reduce power loss to a minimum.

The power saved by **Chapman Ball Bearings** will in two years' time pay for their installation.

Chapman Ball Bearings will fit into the hangers you have now—there is no necessity of going to the time and expense of new equipment.

Write for Catalog 3-B, which explains in detail the savings **Chapman Type Ball Bearings** will effect for you.

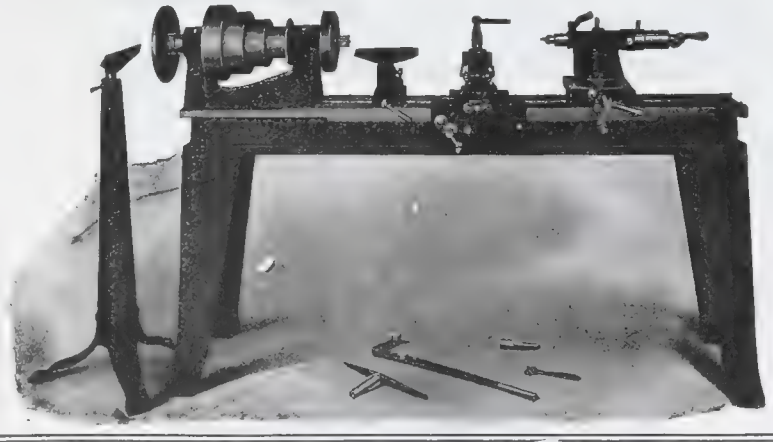
The Chapman Double Ball Bearing Co., Limited

339 Sorauren Ave., Toronto, Canada - 408 Shaughnessy Bldg., Montreal, Que.

The Transmission Ball Bearing Co., Inc.

1050 Military Road, Buffalo, N.Y.

New York Cleveland Chicago Philadelphia Cambridge, Mass.



A Favorite—

Blount Pattern-makers' Lathe

FAST AND ACCURATE—Equipped with set over swivel tailstock and carriage, and outside face plate and tripod. Built in 16" swing with beds 6 or 8 feet in length. Spindle is made of high carbon steel, is hollow and fitted with Morse Taper and runs on self-oiling bronze bearings.

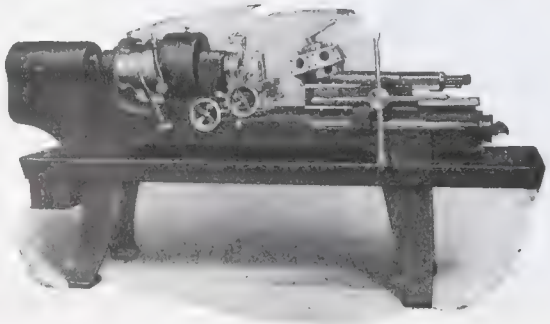
Our catalog gives a full description of this strong and highly efficient machine, also our other quality speed lathes and grinders. Give us your address.

J. G. BLOUNT COMPANY

EVERETT, MASS., U.S.A.

THE TILTED TURRET

A CLEAR TRACK FOR THE STOCK



INVESTIGATE!

SEND FOR

CATALOG "C"

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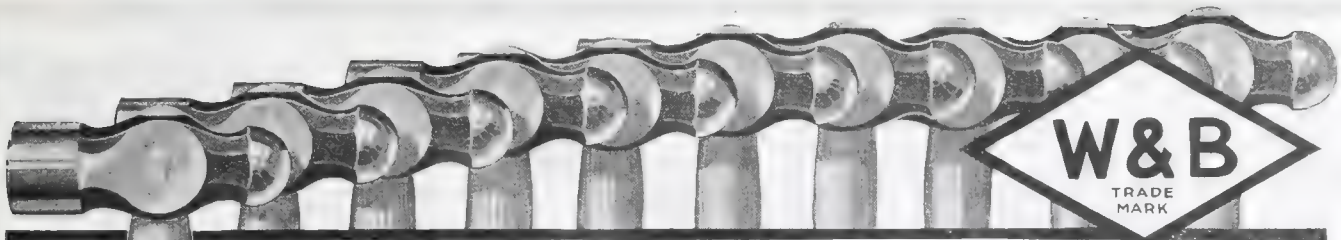
ASK THE USER

WOOD TURRET MACHINE CO.

BRAZIL INDIANA U.S.A.



All Alike

Absolute uniformity is only one of the big merits of every "W & B" Hammer in every class.

Aside from perfect drop-forging from the right grade of steel, all "W & B" Hammers are accurately balanced, finely finished and correct in every detail.

If you lose your hammer or change your shop you can get another "W & B" that will fit your hand and work just like the old one.

Machinists, Ball Pein, Straight Pein and Cross Pein Hammers in octagon pattern with selected white hickory handles are ready for immediate shipment — made in Canada.

Our Hammer line is complete.

THE WHITMAN & BARNES MANUFACTURING CO.

Office and Factory: St. Catharines, Ont.
London Office: 139 Queen Victoria St., E.C.

Established 65 Years

Whitman & Barnes

TWIST DRILLS — REAMERS — WRENCHES — HAMMERS

IN ONE SECOND

The GRANT

Noiseless Rotary Riveter

Spins a Polished Rivet Head

Strong, swift and noiseless, it spins the rivet head to perfect smoothness. Whether rivets used are steel or soft brass it never bends the shank. And it can't break or scar the casting. Rivets tight or loose.

Women operators — or boys—run the Grant. **You need it.**

GRANT
Mfg. and Machine Co.
BRIDGEPORT, CONN., U.S.A.

IMPERIAL CARBIDE

For Welding Cutting and Lighting

HIGHEST GAS YIELD
IMPERIAL CARBIDE
MADE IN CANADA

Manufactured by

Union Carbide Co. of Canada, Ltd.

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Large Stocks maintained at convenient distributing centres throughout Canada

A WALL RADIAL DRILL

That Puts Dollars In Your Pockets

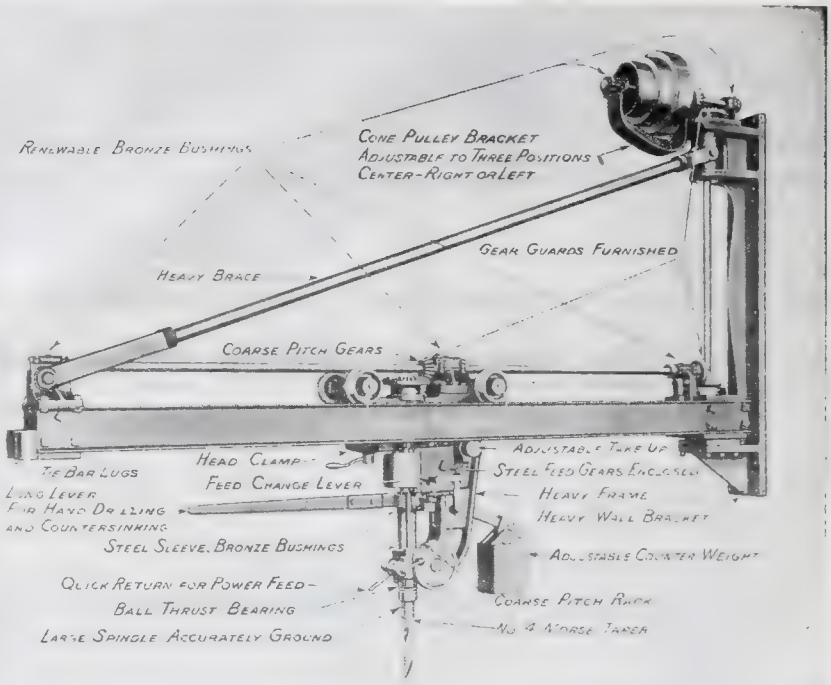
Here's a real machine tool in the wall radial drilling line for your consideration. Listen to this—the machine is made of high grade materials throughout and the workmanship is beyond criticism. It is designed with the particular idea of maximum production, at a minimum operating expense. Entire control within easy reach makes the operators "boosters" for these machines. You can keep the dollars that may be slipping away on your wall radial drilling proposition in your pocket, by the installation of this machine.

Send for detailed bulletin.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue **BOSTON, MASS**

H. COLLIER SMITH

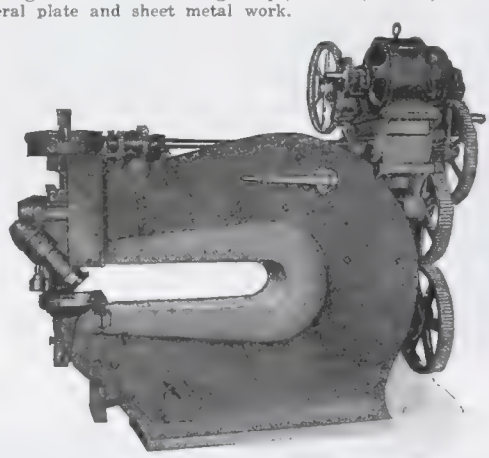
"QUICKWORK"

Registered U.S. Patent Office

ROTARY SHEARS

Made in 6 Sizes

Cut all gauges of sheet and plate metal up to 1 inch thick in straight or irregular shapes and openings without cutting in from side of sheet. Leaves square, true edge that requires no finishing. Used in building ships, boilers, tanks, cars and general plate and sheet metal work.



Patented June 3rd, 1913

SAVES 50% TO 90%

Eliminates Oxyacetylene Cutting and Plate Planing

Write for Catalogue

THE QUICKWORK COMPANY, ST. MARYS, OHIO, U. S. A.

DUNBAR SPRINGS

are dependable springs

We've been making springs since 1845. We've evidently made good. The demand for Dunbar Springs has forced us to put up a big new plant. With better equipment than ever before, we are ready to handle your orders. You might be interested in spiral or flat Vanadium Steel Springs—we've done some good work in this line. If there's anything in small springs or oil tempered Steel Springs of any sizes that you need, it might be well to get in touch with us.

The Dunbar Brothers Co. BRISTOL CONN.

WRIGHT HOIST

Where "Main Strength" Alone Fails

The hoist, as a simple rope and pulley proposition, is centuries old, but the labor-saving hoist is comparatively modern. Being pioneers in the manufacture of hoists of this type, we have learned from experience just how a hoist should be made. It is on this experience that Wright superiority is based.

Wright Hoists serve better because they are made better.

WRIGHT MANUFACTURING COMPANY

LISBON, OHIO

TRADE MARK

CONSOLIDATED

All the energy of America's most modern machine shop and foundry is concentrated upon one product.

CONSOLIDATED POWER PRESSES

CONSOLIDATED PRESS CO.

HASTINGS - MICHIGAN
U. S. A.

CONSOLIDATED

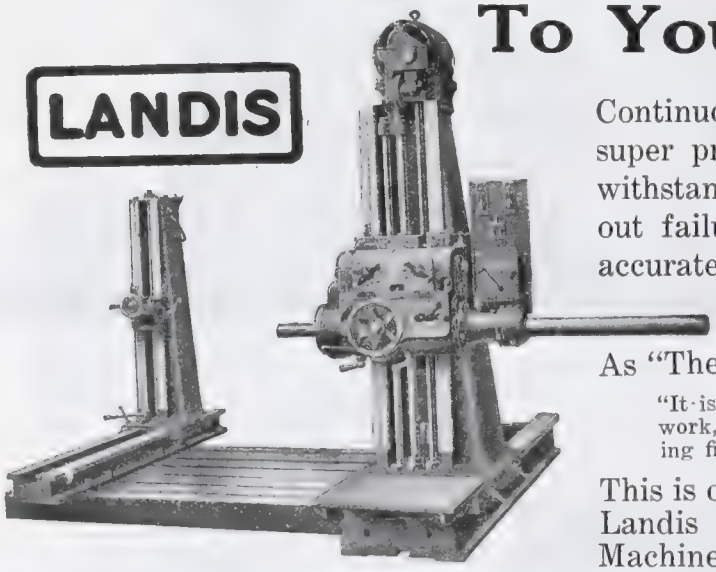
For trimming, stamping forging, punching, embossing.

Special presses are designed where the customer's requirements are unusual.

CONSOLIDATED POWER PRESSES

Does Continuous Operation Mean Anything To You?

LANDIS



Continuous operation means more than super production; it means the ability to withstand long and continued abuse without failure in any part, and yet produce accurately and economically.

As "The Cincinnati Planer Co." states:

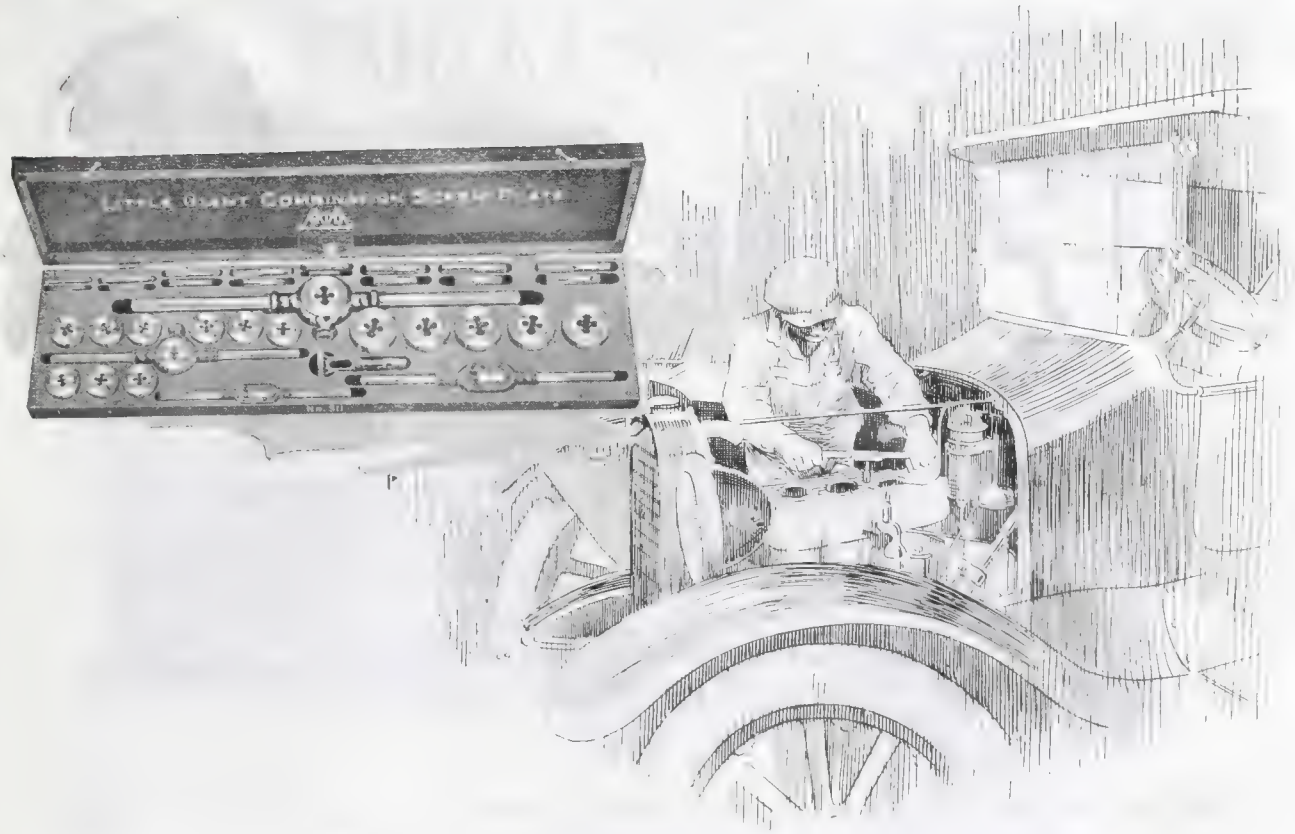
"It is operating night and day, on very heavy work, without a moment's trouble, and is giving first class satisfaction."

This is only part; send for catalog covering Landis Boring, Milling and Drilling Machines.

WRITE FOR CATALOGUE AND FURTHER PARTICULARS

LANDIS TOOL CO., WAYNESBORO, PA.

NEW YORK: 50 CHURCH STREET



Anticipate your sales!

Stock Little Giant Screw Plates!

Little Giant Combination Screw Plates, cutting a variety of sizes in both U. S. and S. A. E. standard threads, are particulary good sellers to the garage and auto repair trade.

With one of these threading assortments at hand the repairman can make new threaded parts quickly and accurately without waiting for parts from the factory.

Our Screw Plates are made in over a hundred assortments, for every need. Select your stock from new No. 40 Small Tool Catalog.

A Post Card Brings It

GTD
PRODUCTS
Taps and Dies
Screw Plates
Reamers
Gages
Pipe Tools
Opening Die Heads
Machine Tools
Threading Machines
Lathes & Screw Machines
Grinding Machines
Cutting Off Machines
Saw Sharpeners
GTD

GTD

WELLS BROTHERS COMPANY

OF CANADA, LIMITED

GALT - ONTARIO

CANADIAN PLANT OF THE GREENFIELD TAP AND DIE CORPORATION

McDOUGALL GAP LATHES

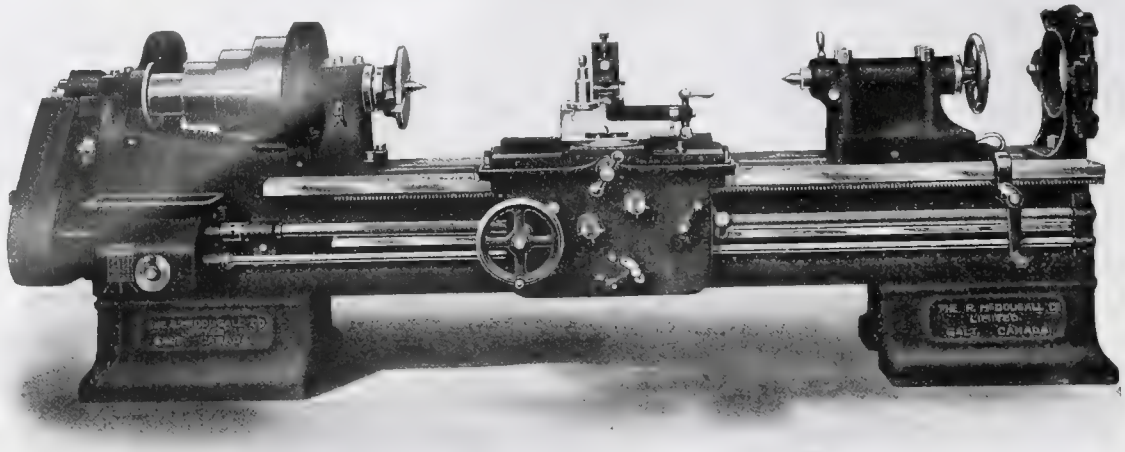
ARE-MAC-DEE IS A GUARANTEE

QUANTITY and quality production simply must follow the use of McDougall Gap Lathes.

The high grade workmanship, materials and liberal proportion of parts all make for unusual strength, rigidity and accuracy.

BE SURE TO INVESTIGATE THE McDOUGALL GAP LATHE.

May we send full particulars?



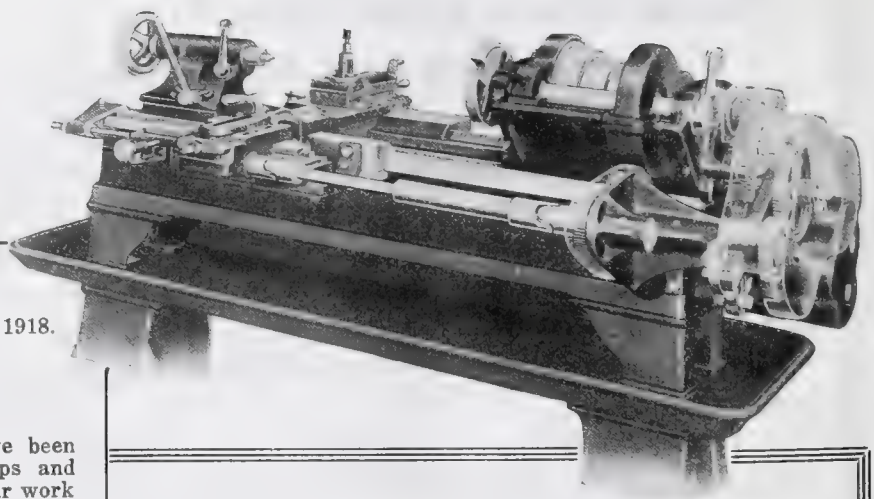
THE R. McDOUGALL COMPANY, LIMITED, GALT, ONTARIO

The Canadian Fairbanks-Morse Co., Limited, Sales Agents

One Customer Says:

"We have the best Lathe in The City of Cleveland to-day"

READ THIS LETTER



B. & W. TOOL & DIE CO.
102 St. Clair Avenue, N.W.
Cleveland, Ohio, Nov. 19th, 1918.

Mulliner-Edlund Tool Co.,
Syracuse, N.Y.

Gentlemen:—

Since installing your 12" Lathe, we have been practically running on Thread Gauges, Taps and Dies, since the 1st of June this year. All of our work has been subject to the Bureau of Standards Inspection, we have readings in our files which are open to inspection to anybody and in any of these readings, we do not find a greater lead error than .0003 in ten to twenty threads and in many cases, absolutely nothing. Our pitchers range from 12 to 40. We consider that we have the best lathe in the City of Cleveland to-day and this statement can be verified by the local Bureau of Standards.

We desire to thank you for the very courteous service furnished us through your Mr. Bull and we feel his personal attention has been instrumental in the successful service your lathe has given us.

With best wishes, we are,
Yours truly,
B. & W. TOOL & DIE CO.
By J. A. Walton

JAW/C"

This is the Kind of ACCURACY for Your Tool Room Work

Great Strength and Rigidity, too, Characterize the

MULLINER QUICK CHANGE LATHE

The quick change mechanism gives 37 different threads and feeds. Another feature is the ring self-oiling system.
Sizes, 12-in., 14-in.; beds, 4-ft., 5-ft., 6-ft. Send for the full details of this ideal precision tool.

Mulliner-Enlund Tool Company
SYRACUSE, N.Y.

POTTER & JOHNSTON

AUTOMATIC MILLING MACHINES

HORIZONTAL VERTICAL

EVERY working part of this machine is built with a view to **increased production.**

CONTINUOUS MILLING

No lost time due to machine idleness because the operator is loading one fixture while the cutter operates on the other.

16 Table Feeds, 7/8 in. to 12 5-16 in.

Length of Table Feed, 28 inches. 12 Spindle Feeds, 20 to 180 R.P.M.

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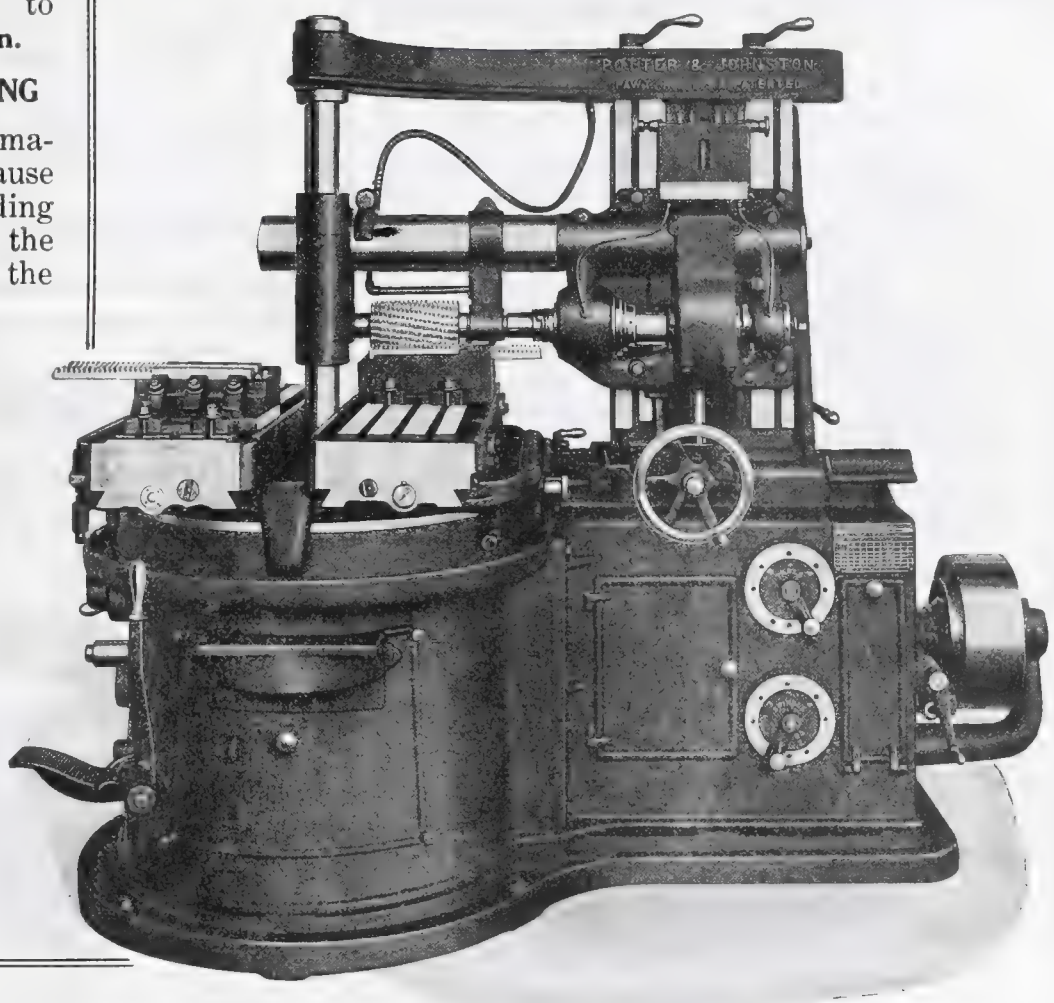

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Notes on Grinding
NORTON COMPANY, WORCESTER, MASS.
No. 43A

Wheel Speeds In Saw Sharpening

When saws begin to show cracks, when they begin to case-harden, and when other things go wrong in the filing room, even though a wheel may be satisfactory until the trouble starts, it is usually the grinding wheel which receives the blame, because no other reason for the trouble can be found.

However, the average filer must be given credit for becoming more educated every day with regard to grinding wheels. He is learning to look upon his wheel as one of his tools and is beginning to treat it as such.

Wheel speeds cannot be depended upon in a filing room where the machinery is run by individual steam engines. The steam line as a rule is connected with the same line as that which furnishes steam for the carriage gun. The number of machines used controls the steam supply and power delivered. A change of 200 to 300 r.p.m. of the wheel may result from a change of only one or two revolutions of the steam engine. When it is realized that a change of 500 surface feet will show an appreciative effect in grinding action, it can be seen that this change is a vital one. Generally speaking, a wheel will act considerably harder as the speed increases.

The generally accepted correct speeds for wheels, the sizes of which are usually used in saw gumming work are listed below. These speeds will give approximately 5000 s.f.p.m.

Wheel Speeds

Diameter	R.P.M. for 5,000 S.F.P.M.
6	3,200
8	2,400
10	1,900
12	1,600

With the use of Alundum wheels saw sharpening troubles are minimized.

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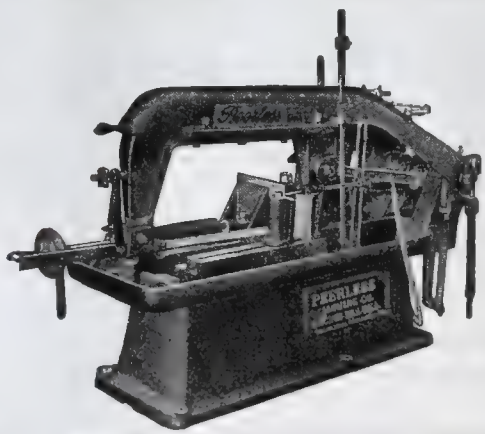

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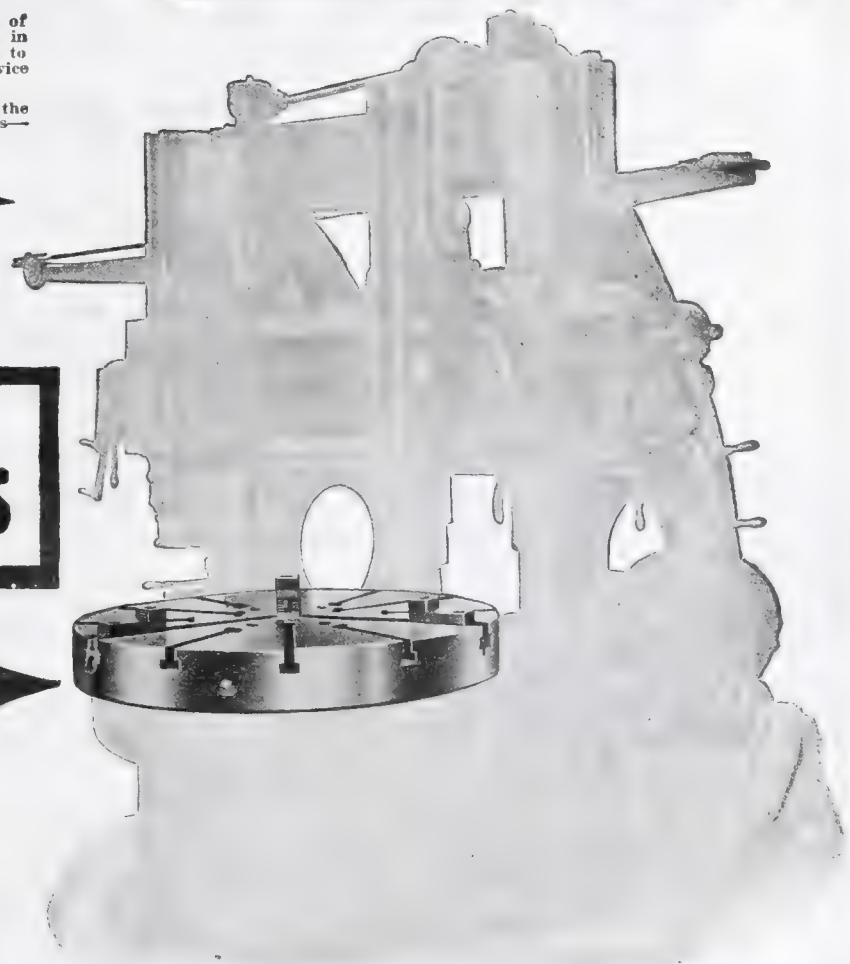

THE TABLES

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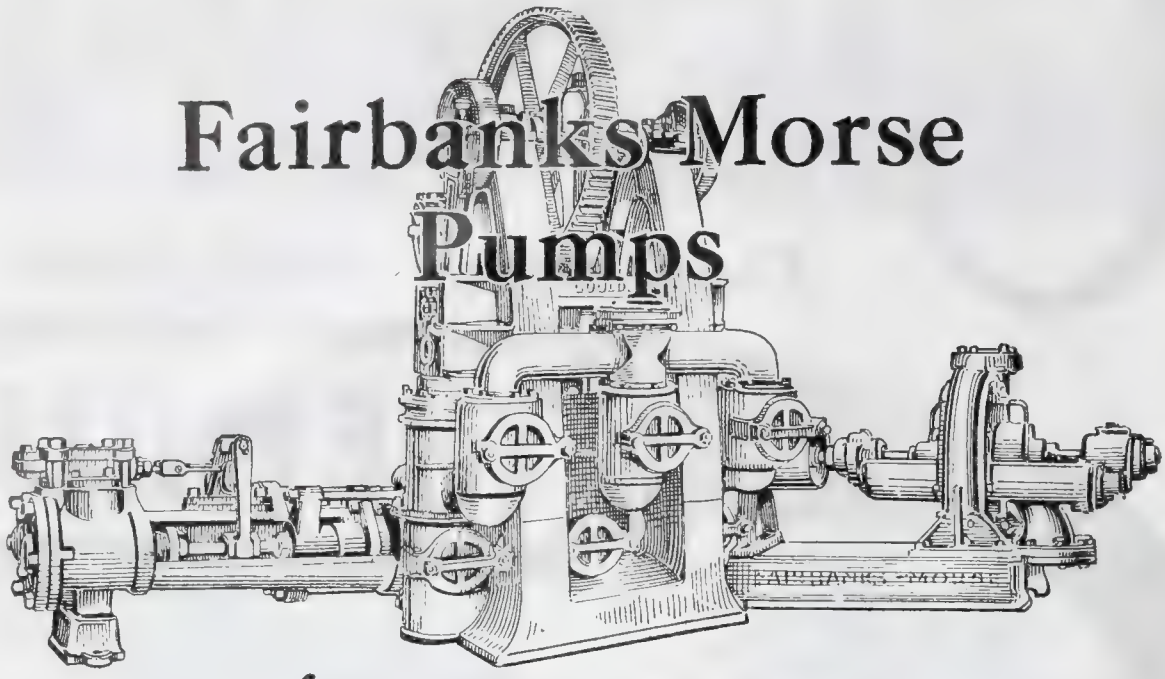

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CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XXI. No. 21. May 22, 1919

Some Interesting Features of The Massey-Harris Brantford Plant

An Article Dealing With Various Jigs and Fixtures as Used, Together With a Description of the First Aid Department, a Very Necessary Adjunct to Any Up-to-Date Plant

By J. H. MOORE, Associate Editor Canadian Machinery

IN these days of advanced machine shop practice, the jig and fixture has come into its own for without the aid of these valuable assets, speed or interchangeability is an utter impossibility. Keenly aware of this fact, the Massey-Harris Company of Brantford, Canada, have kept well abreast of the time, for their machine shop department is a splendid study from a jig and fixture standpoint. Practically every operation of any importance passing through this department has its jig and special tools. These are kept in such a manner that

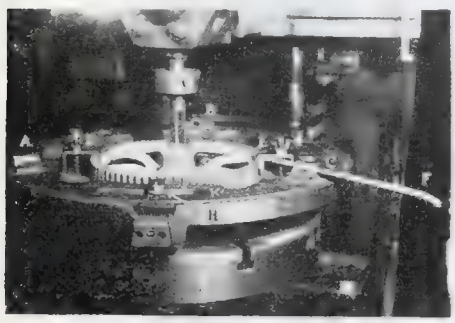


FIG. 1—QUICK ACTION CHUCK.

when the workman desires some certain jig or fixture, all he needs to do is enquire of the jig room attendant for this particular jig, when not only the jig, but its tools, can be found at once.

It is impossible to attempt to describe all these various fixtures, but the writer has picked out a few which he believes will interest the various and many readers of CANADIAN MACHINERY.

Quick Action Chuck

In Fig. 1 is illustrated what is known as a quick action centering chuck, installed on a vertical boring mill table. This chuck is used to grip quickly the gear shown in place on the photograph. This gear is known as the mower driving gear for the 18, 20, and 21 size mower. A study of the photograph will be well worth while.

On placing the gear in the fixture, you use the handle F to tighten the chuck jaws, one of which is seen at G. There are three of these jaws, each being held in place by its dovetailed slide, together with the bolt H. The slot K is constructed on the eccentric principle. Of course, all three slots are arranged similar, so that the very action of pulling the handle in a clockwise direction tightens the work, centralizing it at the same time, while the two clamps D and E are merely safeguards to ensure that the work is pulled down flat on its seating. Readers will notice that there are three receptacles for the handle F, namely, A, B, and C, respectively, the idea for this, of course, being to ensure that one of these holes will always be in about the correct position to the operator when he stops his machine.

The operation performed is that of reaming and facing, the tool being clearly shown on the photograph.

Automatic Milling

The next fixture illustrated at Fig. 2 is that of a special machine and fixture, which is automatic in its action. This machine consists of 4 heads, as shown.

The work itself is what is termed the guard for a binder, and its shape is clearly outlined at A. The two faces, B and C, are the faces to be milled in this operation. Their heights are different, which, of course, necessitates a step cutter, which can be seen at D. These cutting edges are made of stellite and staggered, for the two diameters. They fit together on the male and female principle. E represents the holding device, which is simply a vise, operated by quick action cams, F and G. The work is now fed in by placing the feed lever H in proper position. When the work has traversed through its correct length, the table trips automatically, and returns to its idle position. The standard of this operation has greatly improved since this fixture has been installed, besides ensuring speed and interchangeability.

Another Automatic Milling Fixture

Another milling fixture of splendid design and wonderful production results is shown at Fig. 3. The machine on

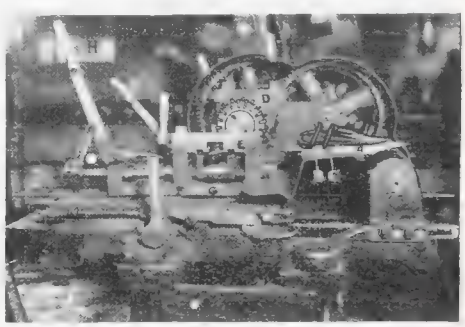


FIG. 2—AUTOMATIC MILLING FIXTURE.

which the fixture is used is a Potter and Johnston automatic milling machine. Of course, readers are, no doubt, well aware that a machine of this nature has a revolving work table, which allows the operator to load up one side of the table, while the fixture on the other side is passing under the cutter. To illustrate in the clearest possible manner the general construction of this jig, the writer has taken this photograph just as the table was swinging around. By this means he has been able to show one complete fixture, the other fixture, of course, being on the other side of the table. It will be noticed that eight pieces are held in each fixture by means

FIG. 3. AUTOMATIC MILLING MACHINE WITH SPECIAL FIXTURE ON TABLE.

of the four handles, A, B, C, and D. The work itself is a mower guard. The faces in this case to be milled are E and F.

To loosen the work, the handles A to D are released, which in turn releases a spring clamp, connected to the bolts shown on either side of these handles. The work then drops out underneath the fixture by a gentle tap with a hammer, in fact in many cases they drop out without this aid.

The cutter used is one with inserted stellite bits, and runs at a very high rate of speed. The work is malleable iron, and is machined dry.

To illustrate the surprising difference which often can be made in production figures, let us quote what this firm used to do with a former fixture on an ordinary miller, and what they accomplished now. Previous to the installation of this new fixture, the speed of production was as follows: 700 guards per day, With the new machine and fixture at work, 1,600 guards is the production figure, with accuracy and interchangeability, which goes to prove that keeping up to date pays in more ways than one.

Snapper Drill Jig

Another very interesting jig is shown at Fig. 5. This fixture is known as a snapper drill jig, the jig receiving its peculiar name from the fact that the spring A causes a snapper action. By this method the work is held firmly until drilled. The cams B and C raise and lower the slide casting D, which in turn pushes the work up against the bushing E. At F we show how the head of this rear coupling bar (as it is called) appears after having been drilled. 15 pieces every hour are turned out on this fixture, an ordinary drill press being the type of machine used. Formerly this work was caught in the vise with very poor results.

Lubrication System

Let us now take up an entirely different subject, namely, that of the lubrication system adopted by this firm in supplying their various machines with the necessary cutting compound.

Fig. 6 illustrates the system clearly. The centrifugal pump A pumps the lubricant up from a settling tank in the floor directly alongside of the pump into the supply tank B. From this tank the lubricant travels by piping to the various machines over which the system has control. This one pump, as shown, controls all the machines in the nut and bolt department. Any excess lubricant pumped up into the supply tank runs back again into the settling tank, forming a continuous process. Under each machine, or alongside it, as the case may be, are constructed channels in the floor about 12 in. wide by 12 in. deep, through which the used lubricant runs back to the settling tank. These channels are covered by iron protection plates, as shown on the photograph at C. Such a method as this is a decided improvement over the usual one pump to a machine scheme as ordinarily adopted.

Novel Stock Rack

In this plant there is a huge warehouse where all the various shapes of iron bars, etc., are stored. One style of storing rack struck the writer as well worth mentioning, owing to its novel and simple construction, so he took a photograph of the same for illustrative purposes, which is shown at Fig. 7. Readers will note that this storage rack is simply nothing more or less than a series of vertical bars, one on each corner of the pile, together with cross bolts of double eye construction for spacing purposes. The advantage of such a scheme is self-apparent, for when not required, your rack, so to speak, can hang up on a good sized nail on a post out of the way. To say that this sys-

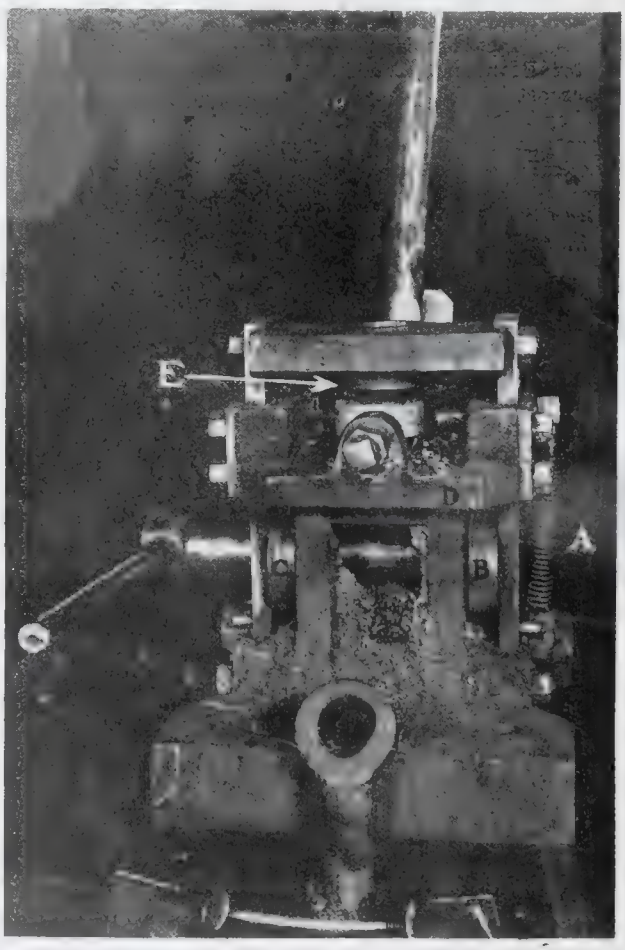


FIG. 5. INTERESTING SNAPPER DRILL JIG.

tem makes a neat looking pile is unnecessary, for the photograph proves such beyond a doubt. An idea such as this can be adapted to almost any line of business.

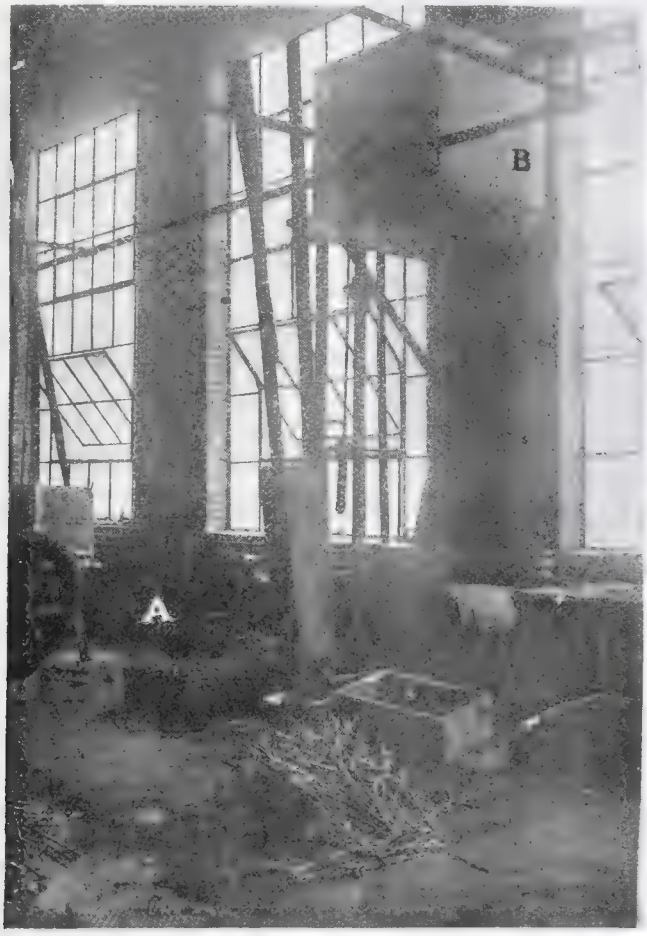


FIG. 6. SYSTEM OF LUBRICATION AS ADOPTED FOR MACHINES

First Aid Dept.

Last, but not least, we touch on the subject of the provision made by this firm for the safety and medical attention to their employees.

At Fig. 8 we illustrate the first aid department, and as no room of this kind is complete without its attendant nurse, we persuaded Miss Slee, the nurse in charge, to grace the photograph with her presence. It was impossible to show all the various fixtures in this room with a camera from one viewpoint, so we have taken merely one corner of the department for illustrative purposes. One can see from the photograph the neatness and cleanliness of this very necessary department, and the writer can only add that it really has to be seen to be properly appreciated. Everything is finished in white, and, of course, this room contains all the necessary medicine cabinets, etc., which form a part of such a department.

Miss Slee, on being questioned as to the workmen's promptness about reporting the little minor cuts and bruises, which so often develop into greater trouble, stated that it was surprising how well they were following out the proper course of reporting. About an average of 30 cases pass through her hands each day.

From the foregoing article readers can readily see that here is a firm strictly up to the minute, and at some future time the writer hopes to again go further into the details of the organization, presenting the same through the columns of CANADIAN MACHINERY.

NEW ELECTRICAL METHODS IN MEDICINE

Electricity, as is well known, plays a large part in the treatment of disease, but its usefulness in diagnosing faults and breakdowns in the human machine is less familiar, except in the case of X-Rays for the detection of fractures and foreign bodies. Several ingenious electrical instruments have been invented and manufactured in Great Britain for giving accurate records of the heart's action and of the temperature of the body. When a current of electricity is passed through the body between the extremities of the limbs, the contraction of the heart alters the strength of the current; by an ingenious arrangement this alteration is made to record itself on a photographic plate. A "cardiogram" is thus secured which gives a diagrammatic account of the heart's action and enables the physician to detect conditions which might escape other means of detection. In taking temperatures, the usual method is to insert a thermometer at intervals and to "chart" the record, drawing straight lines between the points ascertained. With the up-to-date electric method, the record is continuous, showing the slightest variation from minute to minute. Much new light has been thrown on the course of fevers and other diseases by this electrical record, which represents yet another contribution of British scientific and engineering skill to the advancement of the healing art.

FIG. 7 NOVEL AND SIMPLE STOCK RACK

FIG. 8. VIEW SHOWING A PORTION OF FIRST AID DEPARTMENT

Arranging Trays, Wrench Holders and Pans on Machine Tools

An Article Describing in Detail the Various Type of Pans as Used on Machine Tools, Together With Their Advantages

By F. SCRIBER

(Continued from May issue)

MANY types of machines are built up on pedestals, such as cutter grinders, polishers, and various special purpose machines. The nature of the work done on these machines often makes it advisable to provide them with a large work-holding pan. Such a pan is illustrated in Fig. 18, and the pan portion itself is held to the pedestal at A by means of two bolts B, these clamping the pan in place. On some occasions a ring is bolted on the pedestal and this pan is allowed to rest against this ring, it being free to swing on the pedestal in such a case. Unless the pedestal of the machine is so arranged that a pan of the type shown can be slipped over

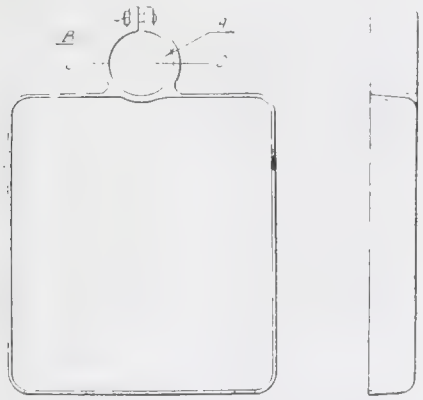


FIG. 18—LARGE PAN FOR GRINDER.

the top it would be necessary to split the round portion of the pan on the line C-C and clamp it on the pedestal with four bolts. In regard to the ring mentioned above, this is sometimes cast in place as part of the pedestal.

A rather ingenious arrangement, combining a door, tool tray and inside tray or receptacle, is illustrated by Fig. 19. The sectional view of this shows quite clearly how this is accomplished, the door, which is of the usual panel type, has the hollow tool tray cast to the outside while to the inside is cast a deep pocket into which may be placed large wrenches, waste, oil can, and various

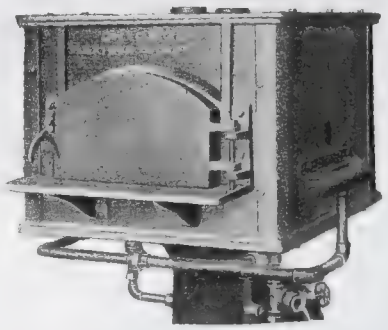


FIG. 20 MUFFLE FURNACE WITH SHELF BELOW THE DOOR.

other articles. This large pocket takes the place of a shelf inside which cannot be very conveniently arranged on some designs.

Fig. 20 shows a muffle furnace with a large shelf below the door, this being very convenient for holding work while slipping it in and out of the furnace, and this is held in place by bolts in the usual manner while Fig. 21 shows a furnace on which the door is arranged to swing down and act as a shelf when so desired.

Locating a pan on a change gear box of a drill press is illustrated in Fig. 22, this being at the left-hand side of the drill at the back; it is not very convenient to the operator in his usual working position, although as most drill presses have no conveniences for keeping tools in it is useful to a limited extent.

Any reference to work holders would be far from complete were not some reference made to the rack or tray shown in Fig. 23. The tray shown in this particular instance is for blacksmith use and is made by the New Britain Machine Co. This contains suitable tongue and hammer holders, a drawer, two shelves and a tray. Various combinations of racks similar in general purpose are in vogue for use with lathes, milling machines, screw machines, and in fact most any purpose where a shelf is needed in a machine shop.

A broaching machine having a combination of four pans is illustrated by Fig. 24, some of which are for holding work and some for catching the chips and oil. A cutter grinder having two pans, one of which, A, is fixedly mounted between the column and bracket, and the other being free to swivel on the column, is shown by Fig. 25.

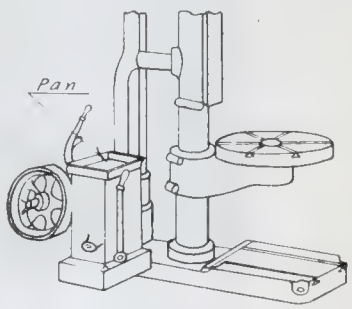


FIG. 22—PAN ON CHANGE GEAR BOX ON DRILL PRESS.

Figs. 26 and 27 show examples of a pan mounted or cast on the change gear box of a lathe, of which Fig. 27 shows how this appears in position on the lathe, while Fig. 26 shows two sectional views of a change gear box having pans cast on top of them.

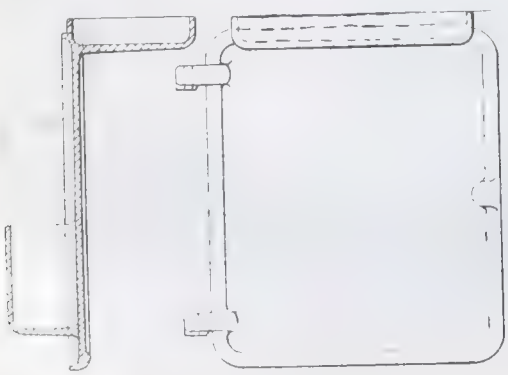


FIG. 19—SPECIAL COMBINATION TRAY.

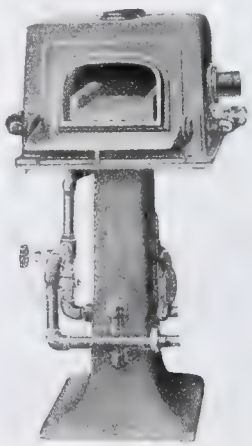


FIG. 21—FURNACE WITH COMBINED DOOR AND SHELF.

FIG. 23—RACK OR TRAY FOR BLACKSMITH.

Referring to the view at the left of Fig. 26, it will be noticed that where the lever A goes through the pan bottom

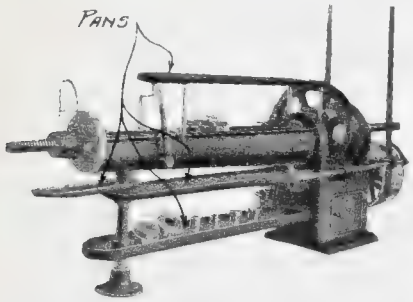


FIG. 24—ARRANGEMENT OF PANS ON BROACHING PANS.

there is a hole through which dirt is almost sure to work into the gears, while by constructing this pan with a wall as at the right of Fig. 26 this difficulty, although not entirely done away with, is very much minimized.

FIG. 25—CUTTER GRINDER EQUIPPED WITH PLAIN AND SWIVEL TRAYS.

A type of stand which most anyone can make cheaply is illustrated in Fig. 28; this is made with a pipe for a stand which has a pipe flange at the top and bottom. The bottom flange is held to the floor by screws, while a suitable board is also held to the flange at the top for holding the work.

It would be almost impossible and undesirable to attempt to cover all the varieties of pans, trays and wrench holders which are met in the factory, and in fact some of our shops abound in such conveniences, put there by nobody knows who, and oftentimes to suit individual whims, but it is believed that enough has been shown of combinations to make us stop and think if we have enough, too many, and are they located properly? These and other questions should suggest themselves from a reading of this discussion.

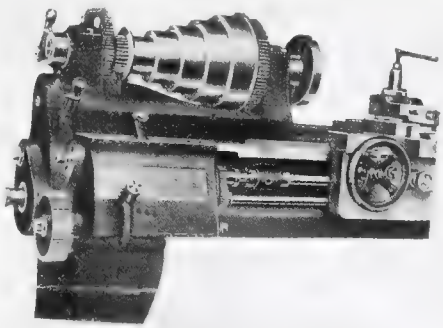


FIG. 27 VIEW SHOWING HOW PAN AND GEAR BOX LOOK ON LATHE.

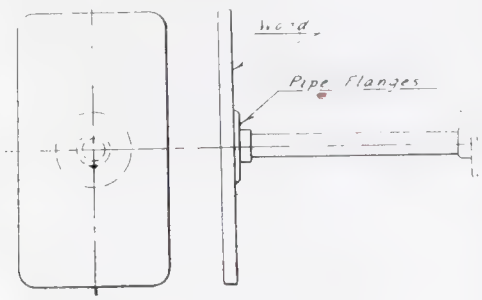


FIG. 28—SIMPLE TOOL TRAY.

SCARCITY OF TINPLATE AND THE USE OF SUBSTITUTES

The short supply of tinplate seems already to have reached the United States, for the Bureau of Standards of the Department of Commerce at Washington invites manufacturers of substitutes for tin cans and boxes to send in their devices to be tested. They are requested to state for what purpose the container is to be used, to give the price, and to say if they are prepared to contract for early deliveries. It seems to be the object of the bureau to obtain cooperation between the manufacturers of tinplate and of substitute containers, packers of foodstuffs and other articles generally put up in tins, and the general public. Great activity seems to be looked forward to in the coming months, presumably in connection with the present war. In every case the object of a package that shall be equal to tinplate is to keep off damp or insects or both.

The subject is a very large one, and its history goes a long way back to the time when skins were the only protective covering used, sometimes tanned, at other times coated with tar. Waterproofed and hardened paper plays a large part in the list of prospective coverings in the shape of bottles, pails, basins, jars and boxes of forms innumerable. India, for many generations, has produced durable papier-mache, but in spite of her vast resources in raw materials she has not touched any of the modern applications of fibre except strawboard boxes that are the reverse of waterproof. At least 20 years ago the Salt Department offered a prize for a suitable package to contain salt, but no satisfactory response seems to have been made. There is no lack of materials in India of timber, fibres, gums and oils which seem to offer the most likely materials with which to work. Glass and pottery can only be used to a limited extent on account of their weight or fragility. Waterproofed cloth has a limited application as it is difficult to find perfectly elastic and cheap coatings. Paper toughened by the sulphuric acid process and afterwards waterproofed, should serve for a good many purposes.

The scarcity of tinplate in India at present, and its abnormal price, should offer a strong inducement to investors to find some substitute that will protect perishable goods from the ravages of moisture, insects and larger vermin. Light material that is not rigid would require to be tough as well as waterproof, free from disagreeable smell and stickiness. A very great improvement might be made in the strawboard if it were rendered damp-proof, with solutions of soap and alum or other insoluble soap, for it loses much of its rigidity in damp weather owing to its porosity. The covers of large boxes begin to sag in wet weather for this reason. Outer coatings are not sufficient to render the material sufficiently stiff. It is possible that with better sizing with a damp-proof material the weight for any given purpose might be reduced and its use for book boards increased.

Many years ago toughened paper was used in bags instead of gunny cloth to carry screw bolts to the extent of several pounds in weight. Unsized paper may have its strength increased to five times the strength of ordinary paper by treatment with diluted sulphuric acid, which is immediately washed away. Commercial sulphuric acid is diluted with half its volume of water. The paper is immersed from 5 to 20 seconds, at a temperature of about 60 degrees F. It is next passed through water, then through ammonia solution to remove the acid, and again through water, after which it was dried in the usual way with felted and hot rollers. It is unaffected by boiling water. A similar effect is obtained by treating the paper with a syrupy solution of zinc chloride at from 120 degrees to 212 degrees F.

Vegetable parchment is principally used as covers for preserve jars, bottles, etc.

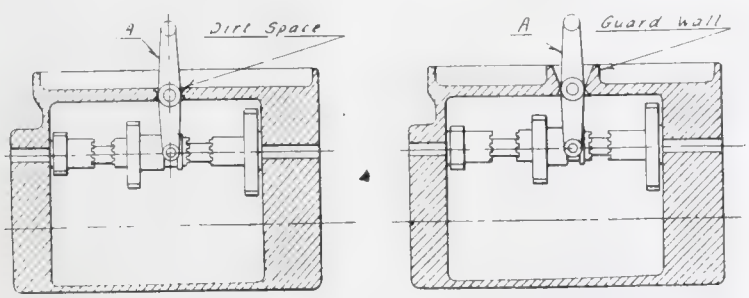


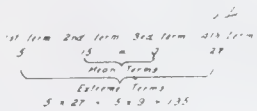
FIG. 26—PAN ON CHANGE GEAR BOX OF LATHE.

Shop Arithmetic; Proportion and Ratio

Fifth of a Series in Practical Mathematics for the Mechanic and Those Learning the Machinists' Trade—The Present Article Takes Up the Subject of Proportions and Ratios

By J. H. RODGERS

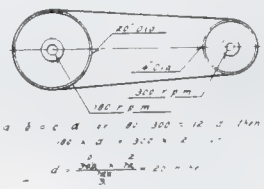
AN element of mathematics that is extensively used in the solution of shop problems, is that of proportion or the equalization of two or more ratios. When comparing the relative values of one number with another it is invariably expressed in the form of a ratio. In comparing an inch with a foot we would say that an inch is one-twelfth of a foot, or that a foot is twelve inches—a yard is three feet, and a foot is one-third of a yard. When figures are used the ratio could be expressed in three different ways, as: $12 \div 1$; $12 : 1$; or $\frac{12}{1}$. It is seldom, however, that ratios are used in their primary sense, as their practical application is more clearly recognized when used in couplets, in the form of a proportion. For instance, in finding the value of the ratio—48 : 16, we would divide the 48 by the 16 and obtain 3, but the 3 implies very little, so that the proper method is to couple the primary ratio with one that will determine its value in a simpler form. Then the above would read: $48 : 16 = 3 : 1$. That is, 48 is to 16 as 3 is to 1, showing that 48 is three times greater than 16. This form of equation is called proportion, or the rule of three, and the general rule may be stated thus: the product of the two extremes equals the product of the two mean terms.



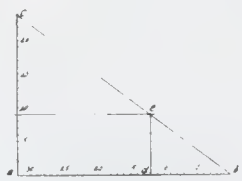
For general application the rule may be expressed in the form of a formula, using the first four letters of the alphabet as symbols of the respective terms:

In using proportion for the solution of shop problems, remember that each terms of a couplet should have the same denomination. Decide, mentally, whether the unknown term is lesser or greater than the known quantity and arrange the proportion in the proper order. Proportion is generally adopted for finding a number that will make one ratio equal to another; in other words, three terms are given, and it is required to find the fourth. Suppose we are installing a new machine, the countershaft for which must have a speed of 300 r.p.m. The pulley on the same is 12 inches in diameter and the line shaft runs at 180 r.p.m.; what diameter of pulley is required for the main shaft?

The unknown quantity is the diameter of the line shaft pulley. Making this the last term and figuring, mentally, that the pulley required must be larger than the known one, we have:

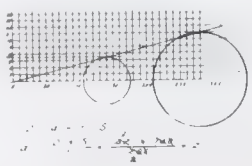


Any proportion may be shown graphically by a simple geometrical figure like the one here shown. Suppose it is desired to show the relative value of the proportion $24 : 32—9 : 12$.



With a base of a certain unit, say ⅛ inch, draw a horizontal line A-B equal to 32 eighths, and a vertical line A-C from the initial point A, equal to 24 eighths. Joining c and b forms a right triangle, and any line drawn parallel to one of these sides will divide the space, or the length of the lines, into a similar ratio. For the proportion above stated, a vertical line drawn from the twelfth division would give the desired length to represent the ratio 9 : 12, the vertical line equalling 9 eighths. Expressing the proportion by the letters shown would be:

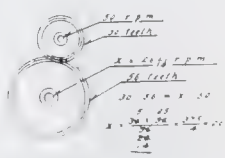
In finding the speed of pulleys it must be remembered that the proportions are of an inverse ratio, that is to say, the speeds of the respective shafts are inversely proportionate to the diameters of the pulleys. This might be more clearly shown by a graphical figure.



It will be seen here than when two pulleys are belted together the surface speed will be the same, but the revolutions will vary inversely as the pulley diameters.

The design of modern machinery tends to reduce the necessity for operators to figure out gear trains for the cutting of different threads, or the operations of shafts at various speeds; this being accomplished now by the shifting of fixed gear trains fitted to the machine and controlled by one or more levers. However, instances are still common where calculations are still required by the men in the shop before certain work can be performed. On the more recent design of standard lathes a man may be able to cut an accurate thread on a shaft and yet be ignorant of the gears that are in mesh in the body of the gear box.

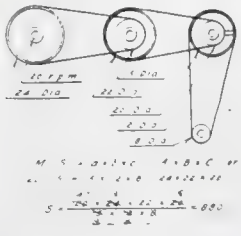
The process of finding gear trains is virtually the same for that for pulleys, with the exception that the number of teeth is used instead of the diameters. In many forms of mechanisms it is essential that a positive drive be maintained, and under such conditions the use of a belt is impractical owing to the presence of slip on the pulleys. A positive drive is absolutely necessary in the cutting of threads, as any inaccuracy or irregularity would spoil the uniformity of the work. If two gears of 30 and 56 teeth are in mesh and the speed of the former is 50 r.p.m., what would be the speed of the latter? As in the case of the belt drive the speed varies inversely as the number of teeth, therefore the proportion would be $30 : 56 = X : 50$—X being the unknown value. Then:



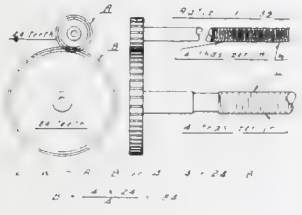
In the case of compound drives the principle is the same, although more factors are involved. The method of solving both compound belt and gear drives is the same, and might be stated, briefly, by the following rule: The product of all the driving units must equal the product of all the driven units. In the sketch here illustrated the capital letters represent the driving pulleys and the small letters the driven pulleys. Using the rule above given the solution would be as shown on next page.

As a train of gears is virtually the same as a belt drive, the chief difference being that the former is direct connected. In the cutting of threads on a lathe the

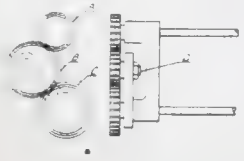
important factor is the selection of the gears that will give the desired advance to the cutting tool, per revolution of the work, so that the required pitch will



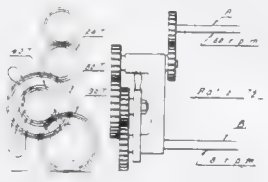
be obtained. As the lead screw of a lathe is always a fixed member it is immediately seen that a different train of gears is necessary for every variation in the pitch of screw to be cut. With a lead screw of 4 threads per inch, what is the ratio of the gears required to cut a thread of 14 to the inch? The gears (direct connected) would be in the ratio of 4 : 14 or 1 : 3½. In the majority of cases the change gears will vary in the number of teeth by 4's or 5's, the smallest in the set being a pinion of 20 teeth. The selection of the gears depends on the ratio required and the gears available. It is not desirable to use too small a gear in a train, although sometimes it cannot be avoided. For the above problem, selecting a 24 gear for the spindle, the gear for the lead screw would be found thus:



The sketch shows the two gears in direct mesh, but this would seldom occur in practice, as it would mean a definite centre distance for the two shafts, a factor that minimizes the possibilites of using various sets of change gears. It is true that the lathe spindle and the lead screw are located in definite relative positions, but some provision is necessary for gearing the lathe to meet the various conditions that are required. Whether this be the modern system of change gears, or by the old method of calculating to find the gears desired, the principle of linking up the train is practically the same, and is done by means of a swinging lever or quadrant that carries the intermediate gear or gears to complete the train. A familiar setting or simple lathe gearing is here shown:



A little study will show that the intermediate gear B has no effect on the relative speed ratio of A and C, its purpose being solely to connect the two main shaft gears. It will be noted, however, that the gears A and C will run in the same direction, whereas two adjoining gears will travel in opposite directions. Compound gear trains are figured out on the same lines as those described for pulleys. A sketch showing a compound train is here shown.



Suppose the shaft A to run at a speed of 60 r.p.m., and it is desired to have the shaft B run at a speed of 8 r.p.m., the change gears to advance by 4 teeth. First find the ratio of the speeds, which in this instance would be 60 : 8 or 7½ : 1.

For simple gearing, using a 24-tooth pinion on the spindle A, the wheel required for the shaft B would be:

A change gear for a lathe would seldom be as large as this, so compounding is necessary. A convenient method is to divide this result in half and use one of the fractions (90) for the shaft B, and any two with a ratio of 2 : 1 for the intermediate pair. This would be:

To prove the correctness of the result it is well to figure back, as indicated by the general rule, that the product of the drivers should equal the product of the driven members.

Further application of ratio and proportion will be dealt with in the following lesson, and likewise throughout the course.

"EFFICIENCY"

By F. G. C.

The word "efficiency" has recently been extensively used in our manufacturing industries. There are some who are not in sympathy with this work as a special branch of shop organization, perhaps because someone they have met has misappropriated the word while aspiring to be more than they had a right to. I have witnessed efficiency work as a workman in the shop, as an executive and in my present position of efficiency engineer, and I firmly believe that an efficiency department, properly managed, is a great asset to every large industrial plant.

Right here let me distinguish between "an efficiency man" and an "efficiency engineer." An efficiency man's work is more or less clerical, or with some simple drawings or chart work, or he may even do time study work, but he should never consider himself an efficiency engineer unless he has a complete knowledge of efficiency work and a thorough practical knowledge of draughting, machine and tool design, pattern making, foundry, machine shop and millwrighting, conveyor systems, etc. Some industrial plants require an applicant for a position as efficiency engineer to show his mechanical engineer diploma, and prove his shop experience before they will engage him. I want to make this point perfectly clear because I believe there are some splendid shop executives who consider efficiency engineering as more of a fad than as an essential part of a good industrial organization. The fact that efficiency engineers have been aped by incompetent impostors should prove that the really competent men have been very successful or others would not have aspired to be like them.

The lot of an efficiency engineer is not always an easy one, sometimes shop executives consider that he is interfering with their work, and as they have been in the shop perhaps for years they think they should know more than he does, and they don't need his help, and others seem to thing that he is trying to show them up, or maybe get their job. Now this is all wrong. He is free to study special problems throughout the shop, while an executive has numerous duties to perform and rarely has time to concentrate long on any one point, and then an efficiency engineer specializes on his work and constantly going through different shops his knowledge is very broadened, more so than the man confined to one shop manufacturing one line of goods or machines. By careful planning and layout wosrk routing of work through the shop, time and motion study, etc., an efficiency enginer can, with the cooperation of the men and shop executives, greatly increase the average shop production (under some conditions as much as 200 per cent.) without undue strain on men or machines.

Theodore E. Butler, London, England, manager for the Whitman & Barnes Mfg. Co., Akron, Ohio, for the past twenty years, recently visited the twist drill and reamer plant at Akron, Ohio, and the wrench and drop forge factory at Chicago, Ill. It was just five years ago that he last paid a visit to the W. & B. factories, having returned to England when the nations were entering the world war. Mr. Butler's conduction of the W. & B. interests abroad during the conflict has been highly commended by the company. Mr. Butler is in his seventieth year, but age has not left its mark upon him and he is the same genial, well-preserved gentleman who twenty years ago succeeded the late H. D. Dennis at London. While at Akron the company tendered him a dinner, where were gathered together a number of his old-time friends and representatives of the company.

Jig Tools and Special Machines

An Article Showing Their Relation to the Production of Standardized Parts

By H. C. ARMITAGE*

THE use of jigs and special tools has grown enormously in the last ten years, and there are very few engineers who have not used jigs, in some degree or form, in the production of their work. Special tools now occupy such a very large place in repetition work that the author makes no apology for presenting a paper on some aspects of them which may be of general interest.

There are many advantages to be derived by the use of jigs and tools, but in this country they have not yet been developed nearly to the extent that is possible. The broad advantages are as follows:

1. Interchangeability of the work. This benefit does not necessarily follow from the use of special tools, yet they help very materially towards it, and interchangeable production cannot be obtained without them.

2. Cheapening of production.

3. The ability to use a less skilled class of labor on manufacturing and production work.

4. The elimination of fitting and the introduction of assembling methods.

What disadvantages there are can be summed up briefly in the following:

1. The use of jigs does not encourage individual ingenuity, skill, or resources, except in a small section of the labor employed.

2. The advantageous use of specialized tool methods requires considerable organization. This is not liked by the British employee, but he complains very much if there is a lack of system.

3. Unless the jigs and tools are designed rightly, the results are likely to be as disastrous as if they were not made correctly.

4. It is usually difficult to synchronize the tool manufacture with the desired production of manufactured parts, due chiefly to the fluctuating requirements of the producing departments.

The ideal system which a firm should cultivate is simply to become staffed and arranged in such a way that full use can be made easily and quickly of a correct relationship between the planning department, the progress department, the tool office and tool-room. If there be a solid foundation upon which to build a good system, the works can expand rapidly with increased business, and in addition there will be little difficulty in changing over from one type of manufacture to another of similar construction.

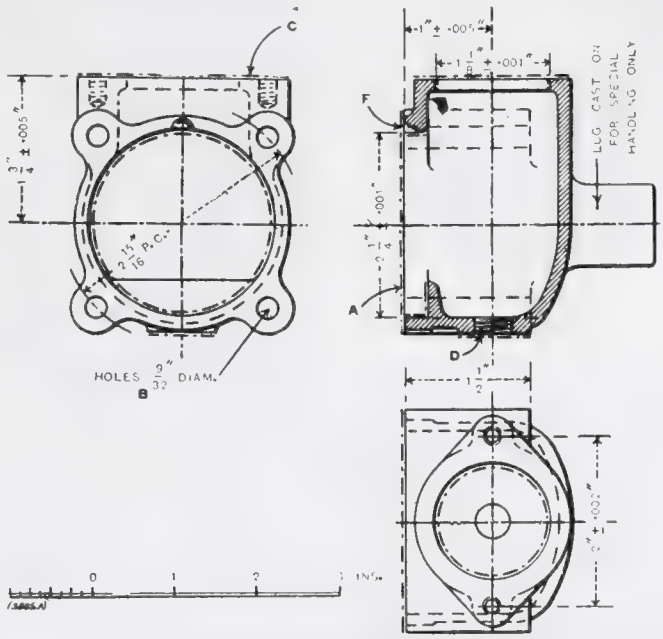


FIG. 1 COMPONENT OF AERO ENGINE.

The effect of the war upon production conditions in workshops has been stupendous. Many firms had laid out their works more or less efficiently for the manufacture of some specialty in comparatively small quantities, and had arrived at accurate manufacture only by "trial and error" methods. In some cases such firms had not altered methods of manufacture for many years, unless forced by competition. In this connection, it is interesting to study the types of works organizations in existence in this country at the outbreak of war.

Development of Engineering Manufacturing Methods

The commencement of the steam engine era was about a century ago. This, together with the railway boom, developed our oldest engineering concerns. At their commencement there was no mild steel, and the process of cutting metals was second in popularity to the forging, casting, and rolling processes, owing to the latter being much cheaper and easier to work; and this was probably due to the non-development of machine tools at that time. Machine work was largely a matter of sheet templates; drawings were almost unknown except as works of art, and the caliper was the recognized measuring instrument. Swiftly following this period came the general development of power-driven machines, and the rapid growth of engineering manufacturing works demanded more and better machine tools. The machine tool industry become firmly fixed, and almost about this time the Springfield Co. of America started the use of independent gauging. Then electrical machinery came into use, and in its wake numbers of new electrical manufacturing concerns were instituted all over the country. These firms in their early days were able to use mild steel, the telephone, electric driving and lighting, turret lathes, and early automatic machines; and, the author believes, were amongst the first to develop the use of drilling jigs, on large size work chiefly owing to electrical machines being more easy of standardization than previous engineering products.

Prior to this date the "toolmaker" was perhaps a man with a bench in the machine shop, whose sole duty was to repair chucks, "peg" broken gears, etc., and any machining he required was done in the general shop.

The electrical machine, however, necessitated the extensive manufacture of press tools, and gradually the tool-room idea was developed, namely, to make tools entirely without interference with production work. Unfortunately, like the pattern shop, the tool-room appeared to have a non-productive aspect, because the goods it made were not directly saleable. The then works managers, therefore, would generally start reducing costs in that department when any criticism of works expenses arose.

The importance of the tool-rooms grew but slowly until the introduction of high-speed steel, which again revolutionized shop practice. Then followed a rapid extension of the "closed-in" department, due probably to the fact that high-speed steel could not be worked upon by all. The milling machine and its cutters were developed, any cut gearing had to be used in machine tools. The grinding requirements of the cutters gradually evolved the tool store, and this, combined with the increasing use of jigs and the increasing importance of the tool-room,

*Paper read before the Institution of Mechanical Engineering.

made a tool-drawing office absolutely essential. At about this date, say 1902, the automobile and petrol engine made its appearance, and again numerous new factories sprang up to take the fresh field of production. Gear hobbing and planing methods, the use of alloy and case-hardening steels, with the consequent development of the grinding machine, rapidly followed.

The grinding machine at once set a new standard of accuracy on all machine tools. With the exception of one pioneer firm in this country, which developed an entirely new line of machine tools, British machine tool makers did not realize that a new era of production had set in, and in the new automobile factories scarcely any machine tools, except of American origin, were to be found. In these new works it soon became possible to work to required systems of limits, but at the outbreak of war only a small percentage of general engineering firms knew how to handle work containing a large number of parts which had to be produced to give limits of accuracy.

Effect of War Conditions on Engineering Practice

The period of the war has seen another rapid development of engineering progress, namely, the manufacture of aero engines and planes, and they in their turn will exert an enormous effect upon the manufacturing methods even of the automobile firms.

The great problem ahead now is to settle the relationships and values between skilled, semi-skilled, and unskilled labor. There is every reason to believe that skilled workers will realize that their welfare eventually depends upon the maximum of production being obtained. Granted this condition, attained by means of a bonus system, or otherwise, successful production then depends upon two things only—organization and special tools. The two go together, and one is useless without the other. Combine the two and there is at once obtained the only desirable features of what America calls "scientific management."

General Works Organization

The centralization of work, with consequent grouping of similar machines, was considered to be the ideal engineering practice a few years ago, but the practice is now deservedly losing much of its favor, where the finished product contains a large number of detail parts. Its chief advantages can only be obtained by the formation of a centralized system of arranging the work on every machine independently of the various foremen. A large workshop should be an aggregation of small shops or sections, in the author's opinion, which can preferably be separated by some form of barrier, but it is essential they should be under a centralized progress system and centralized management. In this way, taking as an example a works producing petrol engines, there would be a crank shaft section, a cylinder section, a crank case section, and each would have its own complete quota of necessary machine tools and its own bonus on output. To start upon a new type of engine, under these conditions, would not be a great problem, as every part on a new design is more or less similar to its predecessors.

There is yet a very much wider field for the semi-specialized manufacturing machine tool. As an example, there is not a lathe for sale which it is not possible radically to alter and improve, which is designed solely for motor car or aeroplane engine crank shafts. It still seems necessary for every concern to design and build a large proportion of its own manufacturing machine tools to maintain its progress and commercial supremacy. The professional machine tool maker can use very few specialized tools in his manufacturing, and a batch of twelve similar machines is as near as he usually gets to repetition work. It is, however, rather a hopeful sign that many machine tool firms are now specializing in particular lines and not making everything that offers itself to them, as in the past.

Degrees of Use of Special Tools

It is a debatable point to know to what extent components should be "jigged and tooled" according to the quantity required "off." There are several firms in this country who lay out and manufacture a complete set of tools for so small a number of pieces as five. This is a small quantity, and depends upon the organization and manufacturing methods employed by the concerns. In the author's opinion, it is more a question of time that should decide the matter; that is to say, if the component can be machined by special tools and unskilled labor in very much less time than with standard fixings, the special tools should certainly be made even if the total cost, including the tool making, comes higher than the mathematically calculated saving. There will be other things to consider, for instance, the time occupied by the shop administration in rigging up temporary tools, the chances of error and scrap, or the possibility of a repeat order. Furthermore, the special tools themselves will have a certain plant value.

Formulae of Output to Pay for Tools

Some formulae, and the mode of procedure, in connection with the foregoing remarks, may be of interest, and are given below:

1. Lay out operations for the piece, using existing tools.

2. Lay out operations for the piece, using special tools.

3. Ascertain definitely what is the total number of parts required.

4. Estimate the cost of machining, using existing tools.

5. Estimate the cost of the special tools required.

6. Estimate the cost of machining with the special tools. In doing this, points peculiar to the establishment should be observed, and the various fixed charges put on each. This is important as the tool-room charge and the manufacturing working cost load is usually different. It should also be borne in mind that with special tools, cheaper labor can be used.

If E equals cost of the component, using existing tackle.

If S equals cost of the component, using special tools.

If T equals cost of the special tools.

If N equals number of parts to be made.

Then, excluding items of expediency, the least number of components required to cover the cost of the tools will be given by:

$$N = \frac{19\,T}{20\,(E-S)}$$

The formula allows for the plant or metal value of the tools (assuming they are never used again for the component), as 5 per cent. of the original cost, which is perhaps rather high.

Similarly, the maximum that may be spent on special tools for "N" components is given by:

$$T = \frac{20\,N\,(E-S)}{19}$$

To give an idea how the formulae work out, they have been applied to a small aero engine component, Fig. 1, above. There is comparatively little machining upon it, and assuming that the casting is to be tooled without special tools, the operations will be as in Table I. To grip the work in a chuck, it will be necessary to cast a small spigot on it for holding purposes.

It is to be noted that the slowest operation is that of setting the angle plate to the correct dimension, 1 in.—0.005 in., but if there were five or six pieces to run through consecutively, a considerable saving in time would result, as the machine could remain set up.

Employing jigs, but no special reamers or other tools, the job would work out as in Table II on this page.

The usual practice in most of the English automobile works at present is to make special tools for quantities of at least 25 components, as the advantages in practice outweigh the difference in cost.

Financial Aspects of Manufacturing Improvements

There is another item worth notice, which applies only to a component which is in continuous manufacture. Let it be supposed that by the methods already in use, each piece costs 100d. to manufacture, and that by designing certain tools it were possible to reduce the cost to 95d. What amount would be justified in plant expenditure in order to effect this saving? The gain obviously would be 5 per cent. (apart from a possible increase in selling value and decrease in percentage of scrap).

TABLE I.

Operation.	Time Allowed.	Rate. per hour.	Cost.
	hr. min.	s. d.	s. d.
1. Preliminary marking off	0 10	1 6	0 3
2. Bore and face (hold in chuck by special spigot) (A)	0 30	1 2	0 7
3. Mark out and drill four holes in front (B)	1 0	1 2	1 2
4. Set up on an angle plate to bore and face end (C)	2 0	1 2	2 4
5. Mark out for drilling 3-16 in. holes on face (C)	0 30	1 6	0 9
6. Drill and tap 3-16 in. holes on face (C)	0 30	1 2	0 7
7. Drill face and tap bottom hole (D)	0 20	1 6	0 6
8. Cut off turning spigot	0 17	1 2	0 4
9. Hand finish where spigot is cut off	0 10	1 0	0 2
10. File notch (F)	0 20	1 6	0 6
	5 47		7 2

If the component is to be manufactured indefinitely, the value of the extra plant expenditure allowable may be taken at 50d. per component per annum, since the increase of capital to produce 5d. extra dividend would have been 100d. This, therefore, leaves a margin of 2½ per cent, and if the output had been 100 per week only, this would give a safe expenditure of £1,080.

Where a component would last, say six months only, the balance between the saving and the total output must be reckoned. Following the previous example, under the given output of 100 per week and the saving of 5d. per component, the expenditure thus allowed to improve methods would have been only £54, but since a lower cost of manufacture implies a proportional reduction in the time occupied, a further 5 per cent. of the 26 weeks' output value may be added for this, giving a total of £108.

This is the manner in which the plant cost of jigs and tools should be considered, but there is no special machine tool which is likely to be designed for cost reduction purposes (and this is a most important consideration), which would not be easily adaptable to alterations in the design of components. Take the matter of tool expenditure in an even larger aspect. If a car or aeroplane could be produced to sell at £500 by using existing methods, then possibly £550 could be obtained for the better quality that would result if special machine tools were used and interchangeability obtained; and certainly the manufacturing cost could be reduced by £50 at least. This gives a total of £100 on every £500, or 20 per cent. If the original capital of the company were £500,000, then they would be quite justified in spending a further 15 per cent. of their original capital on special plant to attain this object—in this case, a sum of £75,000. Unfortunately, the plant and engineering side of the question is not the only one to count, as there would have to be a guarantee that the works could be organized to make use of the special machines to the fullest extent.

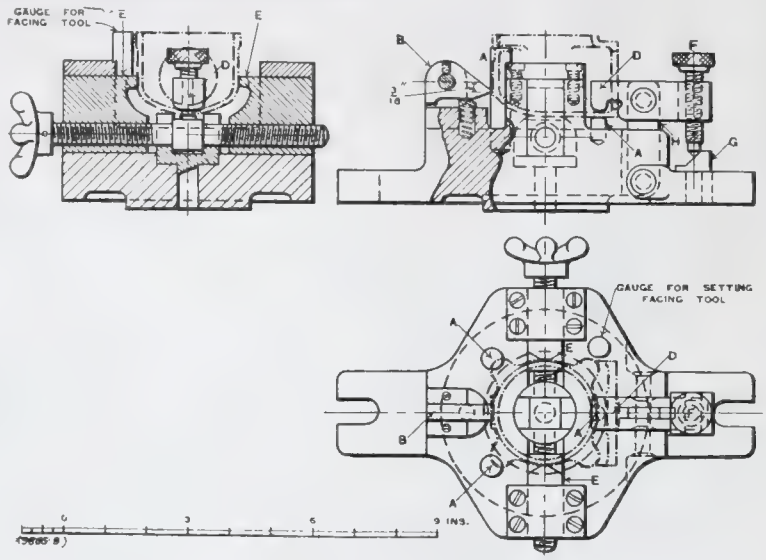


FIG. 2—FIRST OPERATION JIG BORING AND FACING.

TABLE II

Operation.	Jigs and Gauges	Cost. £ s.	Time and Rate.	Cost of Labor. d.
1 Set in jig ... Bore and face at (A)	Jig	10 0	10 min. at 8d.	1.33
	Combined depth and plug gauge .	0 15		
2 Set in jig ... Bore and face at (C). Revolve jig and face at (D)..	Jig	8 10	10 min. at 8d.	1.33
	Plug gauge ...	0 10		
3 Drill all holes. Tap holes where required	Drill jig	12 0	15 min. at 6d.	1.5
4 Mill slot (F).	Mill jig	4 0	2 min. at 6d.	0.2
	Total cost of tools	35 15	Machining cost . . .	4.36

From these two sets of figures we get:—

Cost of component for machining, using existing tackle ..... E = 7s. 2d.

Cost of component for machining, using special tools and gauges S = 4.36d.

Cost of special tools... T = 35l. 15s.

The number of components to cover the cost of tools is equal to:—

$$\frac{19 \times 35l.\ 15\ s.}{20\ (81.64)} = 100.$$

Jigs for Aero-Engine Component

It is now proposed to give a description of the tools for the small component previously mentioned, Fig. 1. The boring and facing jig is shown in Fig. 2, page 403. The machining which will be performed in this tool will be used in locating all the subsequent operations, and is therefore the most important. The work rests on three pegs A, two of which take support under the bolt bosses, and one at the back of the casting. To make certain that the bored hole will be central with the outside, an equalizer E is employed, which consists of jaws moved by a right and left hand screw. These will grip the work and be sufficient to drive the component against the cut. To make certain that the work is set down properly upon the pegs, a special stop B is employed, of which the point of contact is 3-16 inch below the centre line of its pin, and the more horizontal pressure there is against it, the more the component will be thrust on to the seating pegs. The clamp D fills a double purpose by the action of one set screw F. When this is turned round it moves down the taper of the hardened bevel block G, and the clamp being held pivotally upon a link H, it presses both forward and downwards.

With unskilled and female labor it is worth almost any expense in a tool to

save the tightening of several screws in setting work. If a job can be put in a jig and all the necessary locations properly seated, and clamping achieved by one action, the tool is quite "fool-proof." To show how multiplicity of clamping operations can be avoided, the jig, Fig. 3, page 403, is more interesting, and although it is complex, the work cannot be put in wrongly. The piece is located from the previous operation on spigot A, and it is now necessary to face and bore the hole in the top of the component. The jig is practically an angle-plate set positively in two directions, but the component must yet be located in such a way that the machining is square with the general form of the casting. The clamp B with a floating fork C is hinged round the stud D, and clamped by the nut on stud E. On studs D and E is a bevelled recess which slides on longitudinal studs F, and these in turn are bevelled against the equalizing studs. When the nut is tightened, the hardened pins slide against one another and the work is equalized and clamped at one operation. When the front face has been bored and machined, the whole fixture is indexed round 180 deg. by means of index pin J, and the back is then faced and drilled without disturbing the component.

Multiple-Operation Machine

The multiple-operation machine is usually very expensive in first cost. It also requires highly skilled setting up, and is often dependent on one particular man, who has specialized the machine. The cost of the set-up, and the wear and tear of the tools, will be expensive. Multiple operations lengthen out the actual time of handlings per piece, and great care and judgment must be given to the chucking of the work. Usually when several operations have to be performed upon a particular component there is very little space left for gripping, as the area to be tooled is large, and necessitates a very firm grip being taken on a small area, thereby very likely seriously deforming the work. It is sometimes possible to have two multiple machines worked by one operator, and there is a certainty of accuracy between the hole and periphery of the job, which cannot be otherwise guaranteed.

Single-Operation Machines

The chief advantages appear to lie with the simple machine, that is to say, a machine which does the very minimum amount of work and spends the least time upon the individual component. In a large production there is a great advantage to be obtained by making as many operations, and employing the maximum of machines upon the work as is possible. This practice certainly necessitates extra handling, but the gain in time is enormous. The speed with which a job can be put through is entirely regulated by the length of time of its longest operation. It is a point worthy of note that in arranging the work for a shop, there is a great disadvantage in basing the production upon the time of the longest operation, compared to basing production on the time occupied by the shortest operation. Taking a week of 50 hours, and a longest operation of 15 minutes, it is obvious that the maximum production of the components will be 200 per week, and limited by this machine, no matter how many other types or quantities of machines there are in the place. Every other machine which is engaged on other operations will have to be idle throughout a large portion of that week, or set up on other work. For instance, an operation which occupies 7½ minutes would have 25 hours unoccupied. The policy of setting up and breaking down machine tools which have been set up for the particular job is not to be recommended, although necessity sometimes forces the practice. On the other hand, consider the production from the time of the shortest operation. Suppose that it is 2 minutes, then the 2-minute machine would be kept fully occupied the whole of the week, and in order to cope with this production of $30 \times 50 = 1{,}500$ pieces, two machines would be required for an operation which occupied 4 minutes, and eight machines would be required for an operation which occupied 16 minutes. It is therefore very much to the advantage of the work in every way to be able to work upon the basis of one machine for the shortest operation, and balance up from that; there are then no idle machines. It will be further observed from the foregoing remarks that if the 16-minute operation can be split up into two parts which occupy 10 minutes each, there would be a very decided gain in production, and it would be far more advantageous than installing two machines of the 16-minute operation, because it is reasonable to assume that the 10-minute operation will be only five-eighths as complicated. The simpler and shorter the operation, the cheaper is the labor which can be used, and the machine will require very much less setting up, and very much less skilled attention. Output therefore depends upon the time of the longest operation, and if this can be reduced there will be an increase of production.

It will be found in the majority of cases that simple operations are very readily adaptable to existing machine tools and plant, which are often widely different in their original purpose from that required.

In a very large subdivision of operations, consecutive gauging becomes a necessary item, and this should be done immediately after every operation. It is essential that every piece should be gauged as it comes off the machines, even if it has to be moved to a special viewing room, before a large amount of scrap work can be produced.

Tools Scheme for Various Outputs

It is now proposed to show the different ways in which a component may be equipped with special tools, at the same time describing the various jigs in detail, showing the methods to be used. An auto engine connecting rod has been taken as the example. The author would much prefer to have used an aero engine crank shaft for this purpose, but the number of operations and the consequent descriptive matter would have been too great altogether for the scope of the paper. The connecting rod, however, is now of nearly as standardized a form as the crank shaft, but unfortunately for the purpose in view it is a very straightforward piece of work.

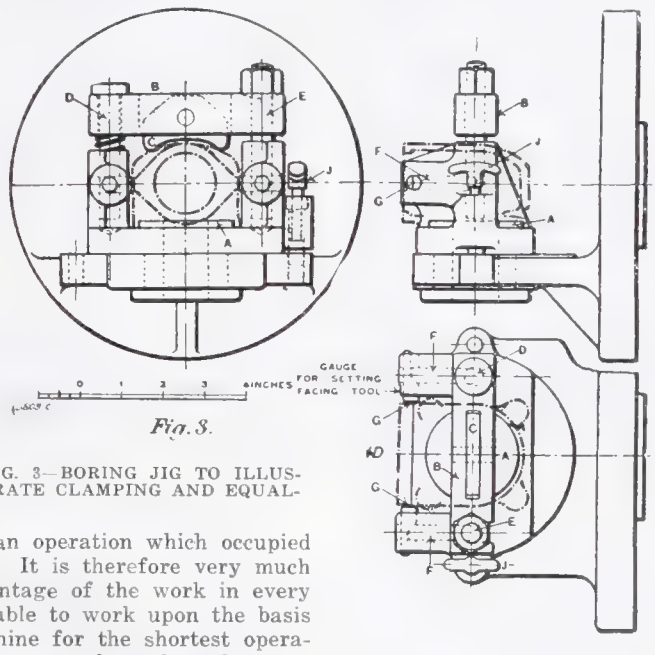


FIG. 3—BORING JIG TO ILLUSTRATE CLAMPING AND EQUAL-

The considerations of the tools required for the manufacture of this component are divided under three headings.

Scheme 1.—A lay-out suitable for a contract of, say, 500 to 2,500 connecting rods.

Scheme 2.—A lay-out suitable for contract of, say, 2,500 to 50,000 connecting rods.

Scheme 3.—A lay-out suitable for the permanent manufacture of the piece, or rather, a practically unlimited output in rate of manufacture and total quantity.

In each case the output will be estimated on the basis of the shortest operation, to obtain the most economical results, as mentioned previously in the paper.

To be continued

WELDING AND CUTTING

Repairs to Boilers and Engines by Welding

An Article on the Welding of Boilers and Engines, Being the Observations of E. G. Hiller at the April Meeting of the Institution of Mechanical Engineers

PROCESSES of autogenous welding had been much used and much experimented with in recent years, both in the form of acetylene welding and electric welding. Such welds would appear to consist of the formation of a fused mass which adhered to both of the surfaces and thus connected them, and the structure of which was more like a soldered joint than an old-fashioned smith's weld. The old term of "weld" generally conveyed that two pieces of metal were raised to nearly a white heat and then hammered together, resulting in practically identical structure at the junction. This condition did not exist with the kinds of welding under discussion, and there might be, with these fused welds at any rate, a change in quality of metal at the junction and possibly a hardening or deterioration.

Welds in New Work and Repairs

Such "fused welds" were of importance and utility, both in relation to new structures and old ones. In new boilers, for instance, it might be useful in some cases for replacing riveted joints, and in old boilers as a means of effecting repair. In engines it might be adopted in the construction of various new parts, and in engine repairs in welding up cracks and similar defects. When used successfully in this way, it has considerable advantages, because it would generally enable the repair to be carried out in much less time and at much less cost than would be involved in casting, machining, and fitting a new part. From this point of view, the question of the adoption of welding had been of importance to the National Boiler and General Insurance Co., particularly in those departments dealing with the repairs to engines.

Advantages of Welding

If broken and cracked cast-iron castings could be satisfactorily welded up, this would be a great advantage from the point of view of the user. With a company, for such welding would generally be much less expensive than providing a new casting, and would also enable the plant to be repaired and set to work in much less time, which generally would be of great advantage from the point of view of the user. With a view to making progress in this particular direction, a considerable number of experiments had been made in repairing under the direction of the company's engineers, and brief details of a few of these welding repairs, both for boilers and engines, were given in the following notes:

Examples of Welding Repairs for Steam Boilers and Similar Structures (Fig. 1, A, B, and C)

(A) Owing to leakage from the bottom of the combustion chamber, wasting as indicated on the sketch took place, corroding away the rivet heads and the overlap. The defective rivets were taken out and replaced, and the whole of the wasted part was successfully built up by the electric welding process. Successful in working.

(B) Broad grooving developed in the root of one of the flanged seams of the flue-tube of a Lancashire boiler, extending about 18 inches round and fracturing through for some distance. The fractured part was cut out by a "V" cut, and the whole of the wasted area afterwards built up to the original form. Successful in working.

(C) A number of the flanged seams of the flue-tube of a Lancashire boiler were severely wasted, as shown on the sketch. These were built up by electric welding and the parts dressed off by pneumatic hammers, and a smooth level surface left. Successful in working.

Other Examples of Welding (Fig. 2, D to K)

(D) Wrought-steel hot-water boiler. Fractured at the fire-hole as indicated. Welded by oxy-acetylene. Repair failed.

(E) Original weld of chimney-tube of a vertical steam-boiler failed; leakage through the weld. Attempted to repair by acetylene welding, but failed. Reasons given for failure: original weld bad; plate burnt; metal would not mix with the soft iron used in welding. Position difficult of access without cutting opening in the shell.

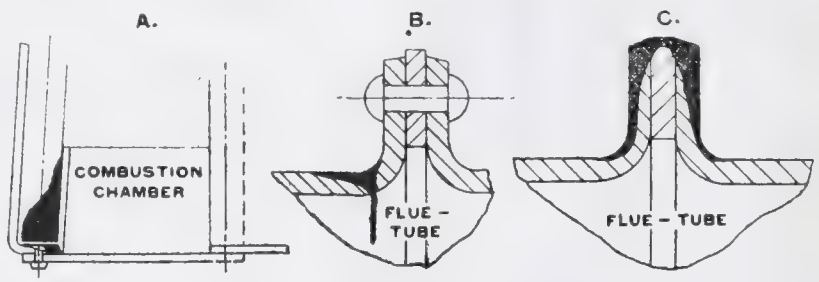


FIG. 1—A, B AND C.

(F) Fracture developed in the chimney-tube as indicated on the sketch. Two attempts were made to weld this by oxy-acetylene, but they failed, and a new chimney-tube had to be fitted.

(G) Wasted at overlap bottom of combustion chamber. Parts built up by oxy-acetylene welding. On completion all appeared satisfactory, and the boiler was worked for a period of three months. On entering the combustion chamber it was found that the seam was again leaking, and on attempt to caulk the deposited metal broke off in layers quite freely. It was decided to remove this down entirely to the original metal, and afterwards to build up the parts by

electric welding, and this was done and a satisfactory job made.

(H) The first two rings of each furnace-tube of a Lancashire boiler wasted on the fire side at each side of the bar level, as indicated on the sketch. It was decided to build up the wasted parts on the fire side by the oxy-acetylene welding process. On completion of the process the boiler was hydraulically tested, but leakage occurred through the welded portion. On examining it on the water side, it was found that the plate had been drawn in, as indicated, during the operation of building up. Further repair was afterwards effected by applying metal at the water side, and this made a satisfactory job.

(I) Leakage showed itself through a fracture, as indicated on the sketch, between two cap-holes in a wrought-steel superheater box. The defect was electrically welded. On steam being got up, the part leaked freely, and it was afterwards suggested that this was due to inefficient work by the operator. The deposited metal was cut out and the groove itself refilled by the same process, and it appears to have been since satisfactory.

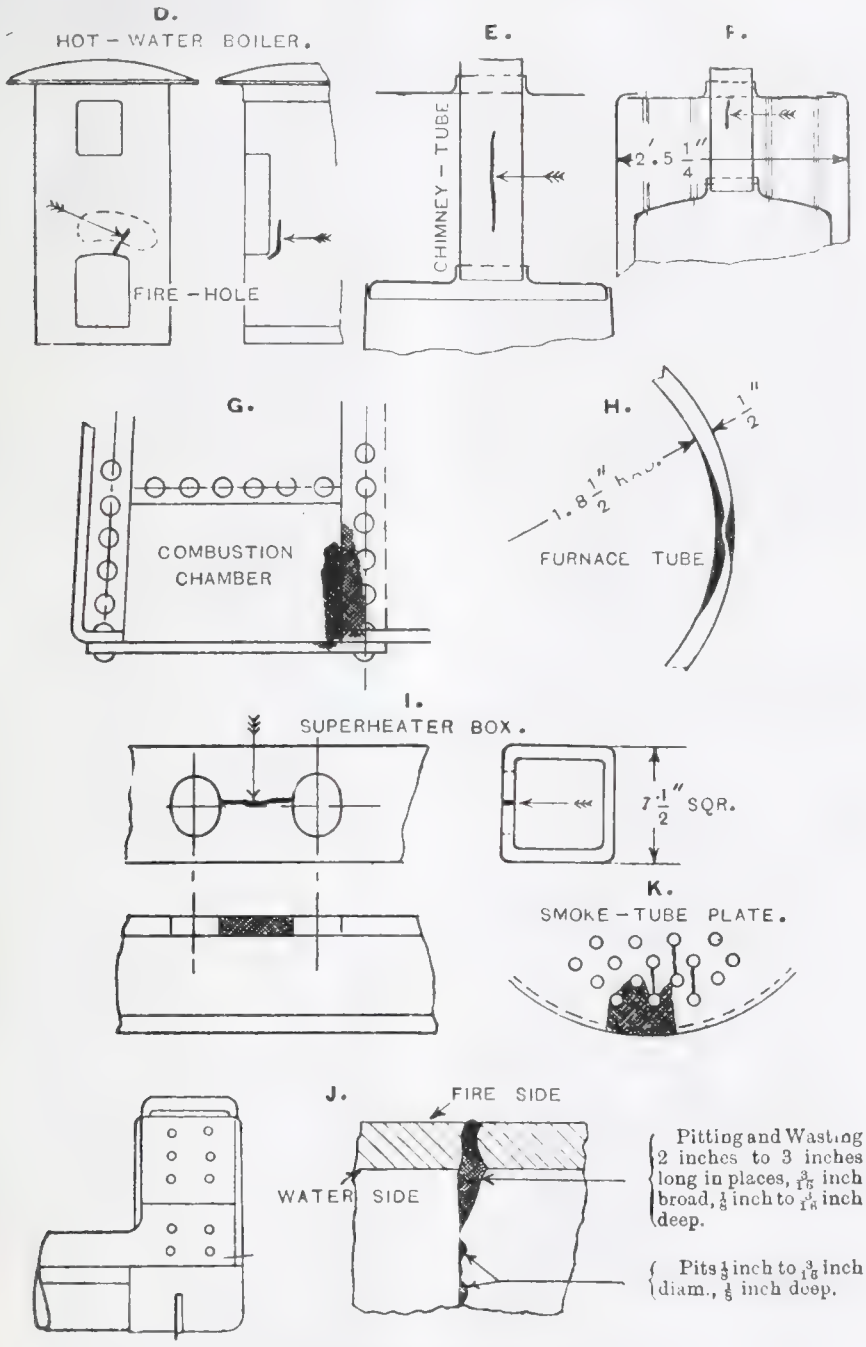


FIG. 2 EXAMPLES OF WELDING.

(J) In this case a repair had been effected by welding in, by the oxy-acetylene process, a patch on the bottom of each combustion chamber, extending the full width of the combustion chamber, and about 3 feet circumferentially. The bottom of the back end-plate of the combustion chamber also had a piece welded in. After about two years' work the bottom of the right combustion chamber fractured, due to local overheating during welding. The plate was found to be brittle, and wasting as indicated on the sketch was noted at the welded joints.

(K) There was wasting, as indicated, at the bottom of the smoke-box tube plate of a portable multitubular locomotive boiler. The wasting was built up by electric welding. When welding was being carried out three fractures occurred between tube-holes in the vicinity as shown. These fractures were also welded up and the repairs appear to have been satisfactory.

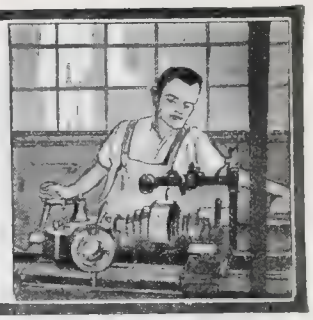
NOMOGRAPHY

Nomography probably deserves to be better known and more widely used than it is. This is a popular account of this art of drawing up laws in proper form. As a general rule nomographs can be easily constructed to give the solution of all formulae, and they are a device of great importance to the engineer of to-day, assisting in the calculations necessary with more rapidity than a slide rule, and without the possibility of the introduction of errors which exist in the use of that instrument. It is equally true that nomography can be an aid to efficiency in the drawing office and factory. With a view to make the plotting of nomographs more easy, have been devised simple adjustable attachments to a slide rule. The first of these is a celluloid protection, with ruled cross lines, one of which is carried across the face of the scale, as in ordinary slide rule cursor, thus enabling it to be shifted to define an exact position on the scale. The other slide has a pivoted arm, capable of being rotated around its pivoted centre, and yet always remains as a radial line through it and be fixed in any position desired. With the improved slide rule the art of nomography should be made much more easy to the engineer and draughtsman.

FIXING LATHES AND MACHINE TOOLS

While everyone admits that tools should be fixed level and firmly, it does not follow that the fixing is all that can be desired, because the time element in the work is too often neglected, especially in the rush of fitting up new shops. Probably the best method of quick fixing is that of using thick wide timbers like railway sleepers, these being on a sound, firm bed and run in with equal parts of Portland cement and sand after being levelled up; but better than this, where time can be allowed, would be beds of concrete of sufficient strength to carry the weight of the machine tool on the existing soil. If such cement concrete beds are reinforced with expanded steel lathing, so much the better, but in all cases the holding down bolts should be put in while making the beds. Small inequalities can be made good after fixing the equal parts of cement and sand run under the machine base, and a firm, level bearing secured.

WHAT OUR READERS THINK AND DO

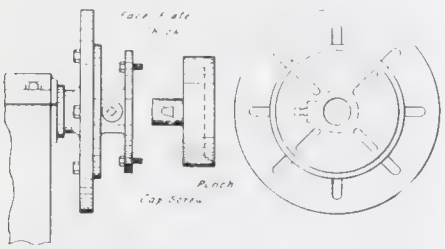


SIMPLE PUNCH CHUCK

By S. Simpson

IN finishing or refitting of punches for sheet metal work, difficulty is frequently experienced in holding them while the operations are being performed. It is not convenient to hold the shank in a four-jaw chuck, and when a solid chuck is used it is often found that the punch will not run true. To overcome this trouble the chuck shown in the accompanying sketch was designed. It is generally found that when holding the shank by the ordinary set-screw the punch will be twisted a little, and it becomes a difficult task to obtain accurate results.

The flange on this chuck has four small slots through which the punch can



GENERAL VIEW OF SPECIAL CHUCK FOR PUNCHES.

be firmly bolted to a true surface without the use of the set-screw. In using the set-screw either with or without the flanged chuck, the shank should be cut as shown, so that pressure of the screw will force the shoulder of the punch back against the face of the chuck.

THE PASSING OF INGENUITY

It was once said of Sheffield that the city was more notable for its industry than its ingenuity. The phrase is one that bites into the mind. Is it possible that a century hence a new race of engineers will use it once more, not only of Sheffield, not only of the United Kingdom, but of all Europe and America as well? We see justification for that reproach—for reproach it is—growing daily greater with every step that leads us nearer to the very things that made Sheffield famous in her day and promised in the end to be her undoing. Only now in her staple trade is she beginning to throw off the lethargy of industry, only now to revive, to re-welcome, imagination and ingenuity. Nothing, in the long run, fails like success. Sheffield brought the manufacture of files and cutlery to the highest position that could be reached by manual methods. She standardized and she specialized and she did all the things that mechanical engineers are now being urged to do in other industries, and the result was magnificent, for a time. Then, when industry had effected its complete mastery of ingenuity, the danger of success began to show itself. Sheffield could not escape from the toils of tradition, she could not throw off the bonds of her standard methods, she could not divert workmen from one way of doing things to another way. We say she could not. That is not quite fair, for she is, in fact, effecting a change, but with infinite difficulty, with pain and tribulation. Ingenuity is coming back to Sheffield. She is winning it back. Will it be recovered by others when their time of trial comes?

It is impossible to change the trend of twentieth century mechanical engineering. It would be bad business to attempt to do so. We are committed irrevocably to mass production, to specialization, to rigs and jigs and standards, to gigantic industrial "combines," to the supersession of individual merit and the apotheosis of mass merit; skill is being transferred from the man to the machine; knowledge is being replaced by the schedule; organization by rule is taking the place of organization by mother-wit; Westminster conference regulations and Whitley council rulings are displacing the power of personality, and welfare systems are regulating bowels of compassion with a card index. We say this flood cannot be stemmed, but let us at least know whither it is bearing us. Let us at least recognize that borne on it mechanical engineering will return whence it was lifted by the old masters, by Newcomen, Smeaton, Watt, Stephenson, Trevithick, Whitworth, Armstrong, Maudslay, Penn and many another whose ingenuity raised it from a craft to an art. Can there be any but one outcome to the methods which are now commended by the most advanced thinkers, by the Cecil Waltons who propose that from youth to age the mechanic should do but one thing, be it no more than the screwing of three-eighth bolts of the gauging of taper pins; or the less advanced thinkers who are content with the proposition that whole factories should be given up to one produce, turning out, year after year, nothing but three-inch piston rings, aeroplane connecting rods, cylinder covers or what-not, all to be assembled in due course on an endless moving platform in a factory which does nothing but erection? Many curious prospects are opened by the vision of these later-day works, but none more striking than the obvious fact that technical education of many will be uncalled for. For of what service will it be? What will it benefit a man—we cannot call him an engineer—to know the stresses in a crankshaft when he can procure nothing but standardized patterns, or to be knowledgeable in the matter of armatures when he buys them off the trays like penny buns? Why waste his time on thermodynamics when modifications of engine design are made impossible by the fact that a million or two sterling has been invested in jigs and rigs, and to change them would be industrially uneconomical? The war showed us that to such perfection had we brought machines that even wholly unskilled labor could do highly skilled work. It showed us also that untrained intelligence could fill the duties, within specialized limits, of trained intelligence. But whilst it carried us forward in four years a step that might have taken forty, it has left us with such a deal of momentum that the wheel it started whirling continues to carry us forward on its rim with barely abated velocity. In another fifty years these things we now foresee dimly will be commonplaces of industry. Brought up in standard creches on standard feeding bottles with standard milk, we shall pass through a course of standard education, be dressed in standard clothes, carried in standard conveyances, live in standard dwellings, dine off standard china, behave like standard citizens all our days, and in due course be carried in standard coffins in a standard hearse to a standard crematorium.

The prospect of mechanical engineering made perfect in industry and robbed if the disturbing element of ingenuity casts a gloom upon the real mechanical engineer, but it has some redeeming features. The acceleration of output will be so considerable that even the six-hour day will be found unnecessarily long, and men will thus have leisure to ponder upon the happier days of the past when their distant forbears might exercise their creative talents—"it is undeniable," wrote Matthew Arnold, "that the exercise of a creative power, that a free creative activity, is the highest function of man; it is proved to be so by man finding in it his true happiness"—to idle with their collections of curios of a time when there was still some variety in the world; to pore upon old books with their descriptions of varied mechanisms or to discuss the nuances of the word "ingenuity" marked with an asterisk in dictionaries of the time to show that it was obsolete. Just as in the present day the twisted legs of

a Jacobean table, carved by hand, are more esteemed than those made by the thousand, like rifle stocks, on a copying lathe, so in those days men will value the things that are not to standard, things that show the personality of some ingenious mechanical engineer of an earlier day, more than the standard things to which progress has brought them. Thank Heaven, much water must flow under the bridge before that time comes, and for us mechanical engineers of the present there is plenty of work in the designing of ingenious machines and methods for the murder of ingenuity in our descendants. Much as we may regret its effects, we are forced to admit that the redemption of trade can be secured only by mass production.

LIGHTING FIXTURES FOR DRAUGHTSMEN

By S. H. PHILLIPS

IT is a well-known fact that in order to secure maximum efficiency from the humble draftsman, you must give him the best of light conditions, natural or artificial, as the case may be. The writer, however, leaves the question of natural lighting entirely to one side, for, after all, such a matter depends entirely on the forethought spent in the drawing office and its location.

The matter of artificial light, however, is one seldom gone into with the care and detail which it deserves, so the writer submits to the readers a fixture used on the drawing board with good success.

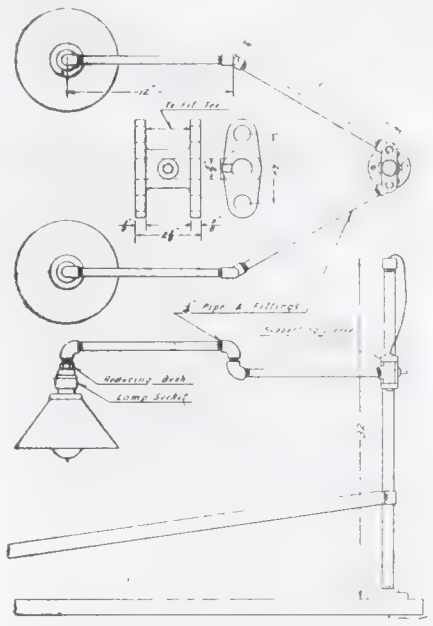
The illustration is practically self explanatory, but a few details will not be amiss.

The bracket is made of ¼ in. and ½ in. pipe and standard pipe fittings, with the exception of the cast iron supporting sleeve, of which detailed dimensions are given. The pipe flange used as a base is drilled and countersunk for four wood screws, and should be a standard ¾ in. pipe flange, bushed to suit, not ½ in. as shown. If the construction of the drawing desk is not the same as shown in the drawing, the base could be supported on a bracket fastened to the desk or in some other way. The strap shown fastening the standard to the drawing board is in most cases undesirable, as it prevents free movement of the board, and would interfere with the cords of the parallel attachment.

The lamp cords are standard No. 18, and lead to the adjacent wall, a separable attachment plug being provided on the main opposite each desk. The cords must, of course, be threaded through the pipe, elbows, etc., as they are being put together, and it will be found that the fixture can then be made up in very short order. The fixture should be given a coat of some suitably colored paint.

40 watt lamps are recommended as giving ample light, plain white tin shades being used. Key sockets should be provided.

The adjustability and flexibility combined with low cost of this fixture has been a source of satisfaction in the engineering department of the Canadian Ingersoll-Rand Co., Ltd., of this city, where they have been used for some time, each draftsman suiting his own tastes as to height and position of the lights, under various conditions.



GENERAL VIEW OF THE LIGHTING ATTACHMENT.

AN ANSWER TO OUR EASY MONEY ARTICLES

By HARRISON JENKINS.

In your April 24th and May 8th issues the writer noticed two articles on the subject of easy money. The first of these seemed to me to be asking the question: "Is there such a thing as easy money?" and answering the very same question in the affirmative. The second was a sort of follow-up story, at which one had to smile to read, how that sometimes easy money is a troublesome affair after all is said and done. But the writer's intention is not merely to speak of these articles, but rather to comment on the effect they have had on him personally.

He has made me think that perhaps I have been turning down real easy money, for with my present mechanical experience I should be able to prepare for your paper some articles of practical value to readers in general. So much have these talks impressed me that I am at present preparing an article which I shall later send for your approval.

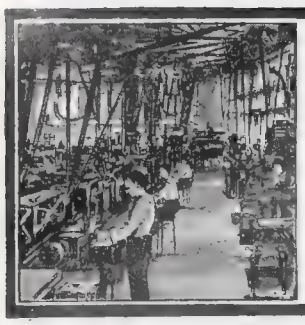
I was just wondering if this letter of mine would be suitable for your use, to show that at least one reader has answered your challenge (for so I call the two articles spoken of), and intends to see if he cannot collar some of that easy money spoken of.

Editor's Note:—We believe this letter should be printed in order to get other readers, likewise, interested.

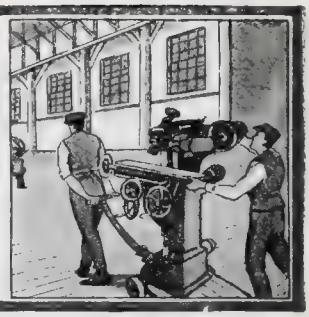
BRITISH AUTOMATIC TELEPHONES

Great Britain has shown conspicuous activity in developing the automatic telephone exchange; and the announcement that a sum of £7,000,000 is to be spent on converting the telephone system of London from "manual" to automatic working is proof that the enterprising trials at Leeds and other English towns have been successful. In the automatic telephone the instrument is provided with a rotating dial having numbered depressions near its circumference. To effect a "call" the user places a finger in a certain depression and pulls the dial around to a mechanical stop; this operation is repeated for each figure in the telephone number required. Thereafter the mechanism at the exchange does all the work. It "selects" the line required, rings the bell of the called subscriber and continues ringing it until the receiver is lifted; "holds" the line clear until the conversation is finished and both receivers are hung up; and then disconnects the line. If the called number is engaged a clear signal is given in the calling telephone. The advantage of replacing the fallible exchange operator by almost infallible machinery is so great that the British example is likely to be widely followed, especially in countries where skilled labor is not cheap and plentiful. Several firms in Britain have specialized in the production of automatic telephone equipment, both for public exchanges and for private installations in offices, government and municipal buildings and factories.

"Kinite, a patented alloy steel," is the title of a new 4-page, 8½x11 in., descriptive folder being distributed by the Kinite Company, of Milwaukee. This new steel is especially adapted for making cutters, dies, taps and other tools with multiple cutting edges. Unlike other tool steels, Kinite is cast and not forged. It has the appearance, however, of a good, smooth forging, and also has a peculiar property in that it does not elongate under tensile strain, nor decrease in cross-sectional area. Castings made from it do not change shape nor form in the hardening process, hence it is possible to make a casting so near the desired shape and size of the finished tool that very little machining or labor is necessary to complete it. This characteristic of not shrinking makes it a valuable metal for moulds for casting hot substances such as glass and metals that melt at or below 1600 degrees F. These substances usually contract on cooling and do not adhere to the Kinite mould, since it does not change shape or dimensions with changes in temperature. The booklet calls attention to the other properties of this new tool steel and contains illustrations of several large dies, one of them being a multiple die, which, while working at a temperature of 550 degrees F., has punched and formed about 4,000,000 pieces. To have made this die from ordinary tool steel, many parts would have to be lapped and ground together, whereas with Kinite, the complete die was cast in a single piece.

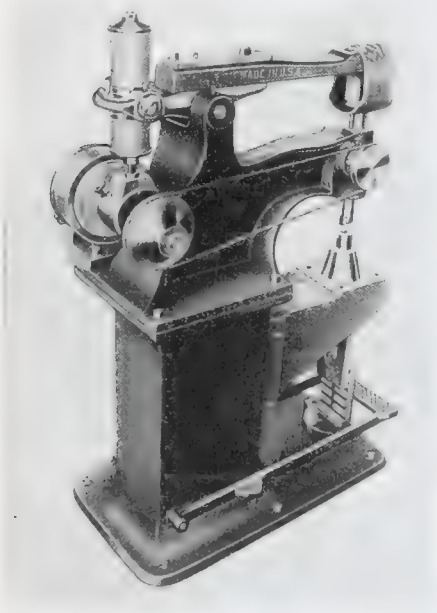


DEVELOPMENTS IN SHOP EQUIPMENT



HIGH SPEED RIVETING HAMMER

REALIZING the growing need for a machine handling heavy sizes of cold riveting, the High Speed Hammer Co., Rochester, New York, in designing this model, have covered the essential points.



HIGH SPEED HAMMER.

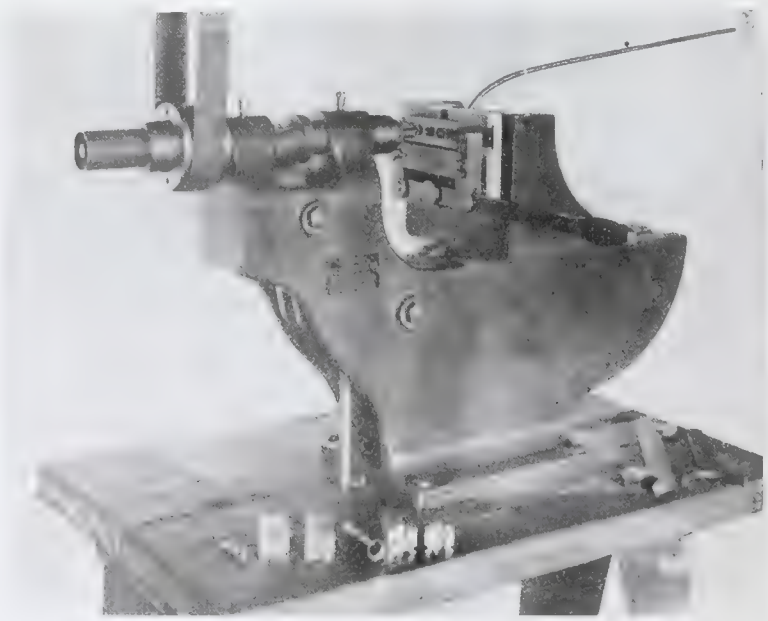
The machine is sufficiently heavy to stand up under the vibration required of a riveting hammer. The bronze vibrator, which is the connecting link between the hickory helve and rubber cushions, constitutes the non-crystallizing member through which all shock is transmitted to the hickory helve, where it is absorbed and is so designed that there is no possibility of rigid motion or striking of parts should the vibration in any case be excessive. This vibrator is a solid bronze member and weighs forty pounds. The eccentric and rear main shaft are made from one solid piece of special steel ground to precision. In connection with this we use special ball thrust bearings; also housed within the eccentric strap and around the eccentric we use a special Hyatt roller bearing. The anvil block is provided with rack and pinion and gear for any adjustment. The net weight of this hammer is a ton and a half. The height overall is 6 ft.; length of hickory helve 2 ft. 8 in.; horizontal gap 16 in.; vertical gap 16 in.; dimensions of base 2 ft. x 3 ft. 8 in. The pein is revolved by means of worm and worm gear, producing a finished sightly head. It produces full round heads cold 5-8 in. to 3.4 in. and oval heads 7-8 in. to 1½ in. inclusive without disintegrating or crystallizing the metal.

NEW SPINNING MACHINE

The Grant Manufacturing and Machine Co., Bridgeport, Conn., have developed and placed on the market a new spinning machine, intended principally for flanging the ends of brass and copper tubing, such as that used for connecting brass or copper pipes to carburetors and oilers for automobiles, aircraft engines, motor boats, also copper coils for hot water heaters. A quick hand clamping arrangement is attached to the table or knee of the machine for holding the tubing securely in position while the flanging is being done. This clamping arrangement is so designed that the gripping jaws can very easily be removed and others inserted to accommodate different sizes of tubing.

The machine will flange tubing from the smallest up to and including 1 in. diameter, and the output from the machine will depend entirely upon the operator, as it requires not over one second's time to form a perfect flange on the end of the tubing.

It will also be noted on the accompanying cut that the machine is mounted up on a bench in a horizontal position, which will permit the flanging of pipes any desired length. The machines are arranged for either belt or motor drive. The flanging is done through the medium of a foot treadle, thus leaving the operator's hands free to manipulate the work.



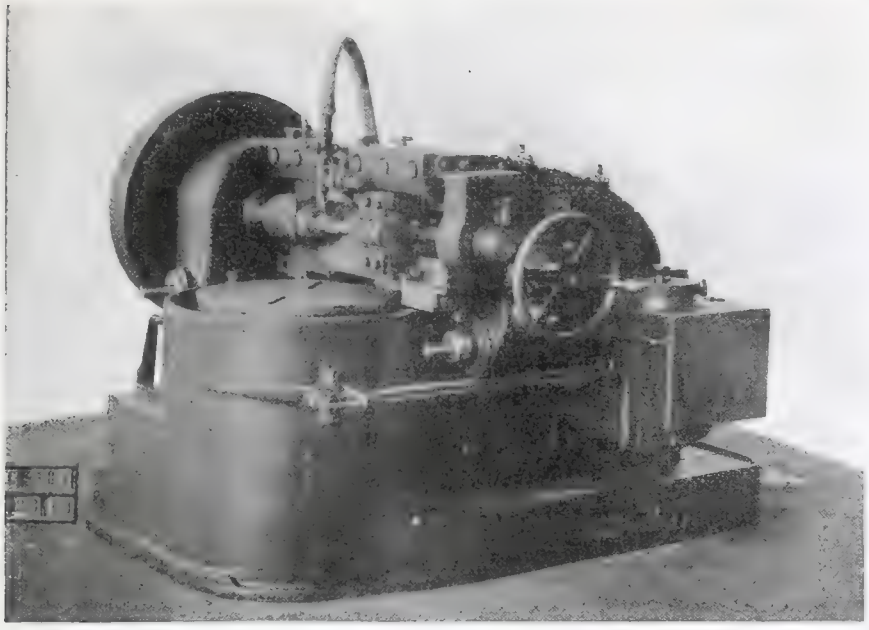
GRANT SPINNING MACHINE.

WORM WHEEL GENERATING MACHINE

The rapid increase in the manufacture of worms and worm wheels, for use in motor trucks, tractors, elevators, and worm gear reduction sets, has created a demand for machines designed especially for this class of work.

To meet this demand, the Gould & Eberhardt Co., Newark, N.J., have developed an automatic worm wheel generating machine, which has been made especially for doing this kind of work.

They have embodied in this machine the many essential features that are necessary to correctly generate worm wheels such as are used in the above applications. These machines will automatically generate worm wheels with a tapered hob, having a tangential feed; a straight hob, wherein the hob is fed into the worm wheel and not across it; and means are provided for cutting worm wheels by using a flytool. The latter method is particularly useful when



WORMWHEEL GENERATING MACHINE.

carrying on a series of experiments, where it would be costly to make up special hobs for every wheel.

The success of the worm and worm wheel drives depends largely upon the accuracy and smoothness with which the worms and worm wheels are cut. The machine to cut the worm wheels of the required quality must be unusually substantial, and with the least number of parts to teminate torsional strains, and to obtain the greatest amount of production from the hobs, without their requiring grinding.

Worm wheel hobs, by nature of their design, cannot be ground back as far as ordinary hobs, with the result that it is highly important that the machines, in which the hobs are used, be of such substantial proportion that the hobs will cut the greatest number of worm wheels, without getting dull.

The cutter spindle drive in this machine is through a powerful worm and worm wheel, with a large flywheel mounted directly on the end of the cutter spindle. It is also important that the work table be of substantial design, and powerfully driven, so that it will be rigid under the heavy strains. To insure this rigidity the table is mounted in a permanent bearing in the base, while the cutter or hob carriage is mounted on horizontal adjustable stanchion. This permits the work table being arranged with a long, cylindrical hub bearing, in addition to a conical and flat bearing and an indexing worm wheel of large diameter, which could not be incorporated if the work table was mounted in an adjustable carriage.

It is essential that the work table or face plate be of convenient height for loading and unloading, and consideration has been given to this in the arrangement of this machine. The first impression gained on looking at this machine creates a confidence that it is capable of doing the work for which it is intended.

All running parts are readily accessible, and all necessary operating levers are conveniently located at the front of the machine, giving the operator full and instant control.

The machine is driven with a single pulley, and an efficient high speed clutch is incorporated so that the machine may be started or stopped instantly. This is operated by a lever at the front of the machine. There are six changes of cutter speeds, ranging from 58 to 183 r.p.m., making it possible to run various diameter hobs at the proper speed for the material being cut.

It is essential in a machine of this type to have a different mechanism to enable the operator to take a second cut through a worm wheel when using a tapered hob or flytool, without losing the lead. It is also an advantage, as it permits changing the feed without changing the lead gears. When using a straight hob, with automatic infeed, the differential is not required and convenient means are provided for locking it.

A portable cutter arbor is furnished. Cutter carriage has automatic tangential feed, in one direction and power return. Automatic stopping device is also provided and may be set so as to stop cutter carriage at any predetermined point. A graduated dial located on stopping device allows operator to set stopping mechanism to stop cutter carriage at any predetermined point.

The stanchion is provided with automatic infeed and power return. When feeding automatically into revolving worm wheel blank an automatic stop is provided, which is equipped with graduated dial so that the operator can set the mechanism to stop at any predetermined point. When tangential feed is being used, stanchion is adjusted to proper depth of tooth and then securely bolted to base of machine, by means of four bolts.

An efficient centrifugal pump is regularly furnished with each machine to allow the use of a coolant when cutting steel or bronze. It is neatly attached to one side of the machine, being driven by gears. It may be conveniently disconnected by means of a clutch.

Specifications

Will cut maximum diameter of worm wheel 18 in. Will cut worm wheels having ten teeth to 100 teeth, including prime numbers of teeth, also from 100 teeth to 120 teeth, except prime numbers of teeth, with hobs having from single to quintuple thread, inclusive.

Will swing maximum diameter of hob, 5½ in.

Maximum length of hob.

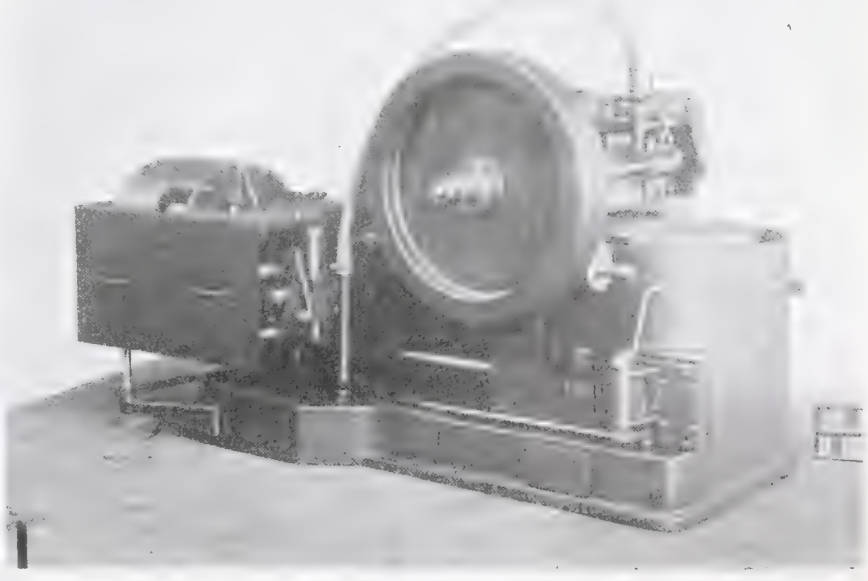
Tangential travel of cutter slide, 10 in.

Maximum centre distance from cutter to work spindle, 13¼ in.

Minimum centre distance from cutter to work spindle, 3 in.

Fixed distance from top of face plate to centre of cutter arbor, 7 in.

Diameter of cutter arbor, which is portable, 1¼ in.



GOULD AND EBERHARDT WORM WHEEL GENERATOR.

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Pessimists Get Out And Stay Out

HE was sitting in his comfortable office, and everything was going fairly well with the business. But that did not make much difference.

Things in general, according to him, were bad. Our exchange rate abroad was putting a millstone around the national neck; strikes and threatened strikes were putting the finishing touches on the ruin; conditions in Europe were so uncertain that nothing could help them.

In fact, he was out to spray with pessimism every person with whom he came in contact.

There should be some recognized and legal method for dealing with the likes of this. He ought to be "canned," to use the rather pungent talk of the street.

He is living in a great country, better than which there is none. He is right in the midst of one of the greatest periods for usefulness and common-sense the world has ever seen.

And yet this chap, just at the period when the world, and Canada in particular, needs his shoulder at the wheel, is sitting at the side of the road, hoping that the cart will start and slip down hill to jibe with his silly little notions.

It would be too much to expect that a world, which had been churned and shaken from centre to circumference for four years, would, at a day's or a week's notice, slide back and jog along just as though nothing had happened.

This country needs the sane optimism of clean-thinking, courageous men. It does not need the whines of the pessimist nor the groans of the blue-ruin brigade.

Unionism, Be Careful

WITHOUT discussing the merits of the present strikes that are tying up several of the industrial centres in Canada—particularly Winnipeg—at a time when they are trying to grope their way from war to peace lines, it is well that the sympathetic strike should be looked into. By this method unions that have no quarrel with their employers, who are bound under agreement to work at certain hours and for certain wages, have quit their shops because other unions are involved in strikes.

One of the basic principles of unionism is that the organization shall be recognized, and that it shall be the medium by which the men shall do their collective bargaining for stated terms and conditions of employment.

One of the greatest things any union ever had to fight for was recognition. And now being recognized, are the unions going to abide by their agreements, or are they not?

The greatest thing that any man can have is the reputation that his word is as good as his bond.

The same thing holds good of a labor union, an employer of labor or anything else.

If labor unions sign agreements to work at certain rates of wages for certain periods of time, and thereby give their employers cause to go ahead and make their plans accordingly, how do they suppose wages can be paid at all if the men refuse to live up to the agreement that they negotiated in good faith?

Unionism is on trial in Canada, and it can either make for itself a reputation for integrity and for the keeping of contracts, or it can toss them aside in such a manner that will make their signature to an agreement in time to come of no more value than the now historical "scrap of paper."

Government's Plate Supply

A DESPATCH from Ottawa, appearing in the Toronto *Globe*, says the Government will buy steel from U.S. at market prices and sell to the shipbuilders here at a profit of $10 per ton. The figures give the Pittsburgh markets at $2.75 per hundred for plate, which is wrong, as the quotation given on March 21, which was the latest change, is $2.65 per hundred pounds. The Government will have to pay 2c per hundred freight, and even if it gets away from exchange, war tax and duty, there will be enough expense in handling to make the freight cost at least 3c laid down here, so the Government would have only $5 per ton spread on the plate, and it would simply be a matter of bookkeeping to show that any money was being made at all.

The article in question goes on to state that the Government, on the plate used in an 8,100-ton vessel, would save $28.000 on the 2,800 tons of plate used. The Government can do no such thing.

If the Dominion Government cares to, it might be in the position of trying out the U.S. market with a good-sized order for plate, that is, unless it is bound up to accept market prices without the influence of competitive bidding.

The American Government, nor any of its departments, have so far recognized the fixed price, and if the Ottawa authorities do so they will be taking an attitude that official Washington has fought and defeated.

Running the U.S. Roads

IF the dear general public of United States ever had occasion to think that riding on the train was an expensive piece of business in years gone by, chances are that they will have a real chance to revise their opinion.

Experts have it figured out that, basing the computations upon the January payrolls that wages being paid by the railways are substantially in excess of $900,000,000 a year more than they were when Government control was adopted. Since then other advances amounting to about $65,000,000 a year have been made.

All this means that some person has got to come forward and pay the fiddler.

As long as Governments control the roads it is possible that all sorts of pressure shall be brought to bear on the situation.

It is a simple matter to shove up wages, but it is not nearly so simple to sit down and try to figure out where the earning power is to be increased to provide for these larger wage bills.

We have read and heard so much stuff about the public running utilities and transportation systems, that we have made the mistake of believing much of it.

From present indications it begins to look as though the Government operation of roads in United States was going to amount to running them into the ditch of financial disaster.

Two Points at Variance

THE Bell Telephone Co. made a strong plea with a poor face that it had to have more money to run its business. It managed to get this past the Railway Board at Ottawa, and consent was given to the increasing of the rates ten per cent.

The ink had hardly been dry on the paper when it was announced that there would be a new stock issue of $4,500,000 to its own shareholders at par.

Bell Telephone is placed, at the time of writing, at 130 on the Toronto exchange, and 132 in Montreal. This is equivalent to a handout to the shareholders of $1,350,000 on the Toronto rate, or of $1,440,000 on the Montreal price.

If the Bell Co. could not get along on the rates it was securing it stands to reason that it should have secured every possible dollar for the stock it had for sale.

The plea that it was hard up and the fact that it sells stock on the new issue away under market price are two points that cannot be reconciled.

A CALIFORNIA man got fined for running his car at 43 miles an hour. Forty-two miles an hour on a crowded street is not bad, but adding that extra mile is the straw that chokes the camel.

* * *

CHICAGO police say confidence men in that city took in at least ten million dollars last year. If these folks only knew enough to keep their coin in a sock or the Sunday sugar bowl they'd be saved a heap of trouble.

* * *

A WOMAN conductor on a New Jersey street car was kind to an old man and got $6,000 in his will. The only trouble with this is that most old men with $6,000 have about 60,000 places to put it.

* * *

U.S. shoemakers say that each immigrant who returns home to Europe takes eight pairs of shoes with him. The Yankees are in danger of losing their sole in this way.

* * *

ICE in Chicago increases $2 per ton. This is the high cost of a warm winter. If the coal man don't get you the ice man will.

The Millionth of an Inch

SOME folks is always hankerin' for to do some foolish thing, to say some startlin' statement or 'sassinate a king. They seem to have a mania for things what's strange and queer, you wouldn't think they had a brain tucked in behind their ear.

And then there's other things they do that seem to me most strange, they're clean beyond my vision, ten miles outside my range.

Now, take the chap what took an inch and carved the thing in two, I guess he thought that was a trick to puzzle me and you. And then some prune, he come along and split the thing in four, and them what watched the show that day they hollered out "encore!"

Well, time went on and bye-and-bye these choppers whacked away, until the chiefest of the lot rose up one day to say, "I've took that inch and by the use of hammers and of charts I've sliced the thing, by heck I have, into a thousand parts!"

Well, folks they donned their goggles for to see the bloomin' speck; it weren't no bigger than a hair what sprouts upon yer neck.

Well, not content with that there stunt, they started in once more, and sliced and rubbed that thousandth right down unto the core, until we read in words what make my fists go in a clinch, about there being in measurements the millionth of an inch.

Oh, I'd like to lay my husky hand upon that whiskered guy, who caused my head to swim about when I went out to spy, to gaze upon the millionth part of that there inch of ours, I've looked until my eyes most bust, I sweat for hours and hours.

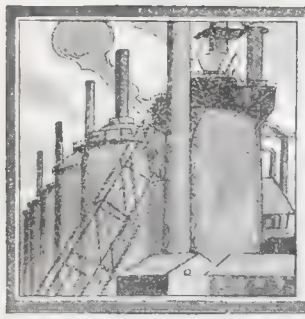
I rise to say out good and loud so all your folks can hear, no matter if you dub me odd and just a trifle queer, "There ain't no such a thing about—to me that is a cinch —as that there atom that they call the millionth of an inch!"—ARK.

THE U.S. cables, railroads, steamships, 'phones and telegraph service are soon to be restored to those who owned them prior to the war. It looks from here as though the job of getting them ironed out again would be proof against unemployment in certain circles for some years to come.

Current Events in Photograph

THE MACHINE HAWKER USED

This is the machine in which Harry Hawker and Grieve left to cross the Atlantic. Up to the time of this paper going to press no word had been received as to what became of them. One report had it they were sighted off the Irish coast.



MARKET DEVELOPMENTS

Market is Apparently an Open One Now

But It Has Made No Difference as Far as the Prices Are Concerned —New Lines in the Scrap Market Are Showing a Little More Strength

THE steel market is supposedly an open one now, but there is nothing on the surface to indicate such a condition. Prices are the same and the limited volume of business moving is also about the same. The return to an open market removes all the reasons that have been advanced for the non-recovery of the steel purchases. The keeping on of restrictions was blamed for a while, then the prices fixed were too high. These were lowered, and still no improvement. As a last resort the fixed price was made the goat, but now the machinery for maintaining a fixed price—if indeed any ever did exist—has passed away. If buying shows no signs of improvement a new set of reasons will certainly have to be presented to the trade in short order.

As a matter of fact there are more disturbing elements in operation just now than there are corrective or reassuring influences. The fact that peace has not been signed and the number of serious strikes are tendencies that are being felt in several ways. There are indications, though, that good business is not far away. Several firms are getting returns from adjustments from war work that was cancelled, and this is going to provide money for new lines, and also enable old plants to be sold or scrapped. In fact, the scrap metal market is expecting that some of this machinery will come its way, as the quotations are a little stronger now for No. 1 machinery scrap.

Coppers are also showing a little stronger in the scrap market, thus sustaining the belief that copper is going to be stronger and higher for the fourth quarter. As soon as shipping space is available there should be a good business done in exporting scrap metal to the Old Country, as this market has been cut off for a long time. Before the war it was one of the biggest items of the business in this country.

Dealers in machinery and supplies are doing a fair amount of business. The automobile and railroad business are the biggest buyers at the moment. In fact, they have been the best customers for some time.

MONTREAL HAS HAD A RATHER QUIET WEEK IN MACHINERY LINES

Special to CANADIAN MACHINERY.

MONTREAL, QUE., May 22—Despite the fact that a general feeling of unrest prevails throughout the country, there is an undercurrent of activity among many manufacturers, not outwardly pronounced, perhaps, but, nevertheless, evident when the surface of reserve has been removed. Several plants in this district, that have been idle since the beginning of the year, are gradually being cleared of the old munitions machinery and made ready for more permanent lines. Others are quietly preparing for new enterprises, but definite announcement of their intentions is being deferred. The prospects are that general business activity will show substantial increases during the summer months. Operations in steel circles show little change as a result of the release from Government control in the States, and the supposition that open competition would tend to lower prices has, as yet, come to naught, as market conditions have not been greatly influenced by the recent developments in the American situation. Machinery is again creating interest, with the general increasing demand. Scrap is still in a dormant condition, with inquiry light.

Recent Changes Have Little Effect

Steel and iron trading has entered on another epoch, following the resignation of the American Control Board, and the placing of the market on an open basis. Nothing has developed, however, that would indicate that the actual conditions were really a consequence of Government regulations, as the situation has not yet been affected as a result of the change, nor is it expected that any radical change will take place for some little period. Present selling prices are of a reasonable character, when due consideration is given to all the circumstances surrounding the working conditions in the steel trade. The factor that is the chief controlling influence in maintaining a steady market is the labor situation. Price-cutting in steel could only come about by reduced costs, and reduced costs would probably mean lower wages, and any immediate proposition to this end would likely result in increasing the unrest that is evidently prevailing at the present time. Many are beginning to see that the best way to reestablish the pre-war state of affairs is to provide work for the unemployed, and developments are shaping into a renewal of domestic activity that will ultimately result in a resumption of enterprise, both old and new. Movement of steel in this section is not heavy in volume and dealers are well able to take care of the business passing, but are still showing a reluctant spirit regarding the restocking of warehouses. In some instances material is being sold at figures lower than purchase price, due to the fact that this stock was obtained at high war prices and carried over. This stock, however, is gradually being disposed of, and dealers are willing to see it leave the racks, even at a small loss. When approached regarding the possible trend of the market, few will come out with a clear prediction, but invariably the contention will be that price reductions are unlikely, rather the other way. The uncertainty of labor is a big factor, and any move on the part of producers must be carefully studied before action is decided on. Developments in the Nova Scotia steel situa-

tion are occupying the attention of steel men at present, and sensational developments in this direction are anticipated. Price quotations here are unchanged, with the market quiet on light demand.

Steady Improvement Continues

It still appears that the steady inquiry for machine tools is of a permanent character, as many dealers here report a good week. No particular line seems to feature the trading, as sales of a general nature. The refitting of several plants here is quietly progressing, but no definite announcement has been made regarding the product to be manufactured. One firm here has had a representative in the States looking over the tool situation and general business conditions, and in a short time they anticipate entering on an extensive manufacturing program of a new line. The refitting of the Lachine plant of the Maple Leaf Manufacturing Co. and within a month production of commercial motor vehicles will probably commence. Supply business has shown improvement during the past week and prices generally are firmly maintained.

Several Disturbing Factors

But Dealers Say Conditions are Better Than Anticipated in Post-War Trading

TORONTO.—In spite of the many unsettling influences that are at work dealers are prepared to admit that business is fairly good. The automobile business and the railways are still the chief buyers, but their orders are for fairly good lists.

Even that section of the trade that is inclined to be rather pessimistic is willing to admit that conditions since the armistice have been much better than they had anticipated could be possible in the first six months following the war.

The settling of the strike disturbances, and the signing of the peace terms would go a long way to giving to the markets that degree of assurance and confidence that is so necessary before there will be very much buying done on an extensive scale.

The Machine Tool Trade

Local dealers state that on a good many of the best lines they have to handle delivery dates are much poorer than they are as a general thing. Several weeks, in some cases months, are required before the machine can be delivered. They attribute this to the extensive buying campaigns that have been carried on by several of the automobile concerns which were all ready as soon as the war restrictions were taken off to go ahead with an extensive line of manufacturing. This has in many lines lifted all the available tools out of the market, and leaves nothing in stock.

As one of the men in the trade pointed out to-day, "A number of the firms that had contracts with the American Government for war work are coming nearer to the point where they will get their settlements, and in this way considerable money will be loosened up to enable these organizations to go along with any programme they may have under way, which calls for the laying out of money on equipment. There has been a lot of cash tied up in this way and the settlement of these claims ought to be a matter of considerable convenience to several of the firms thus involved."

The Scrap Metal Trade

Light and crucible coppers show a little more strength in the market than for some time past, and as a result the prices are up a half cent. per pound. Dealers believe that this tendency will be maintained and that it will become more pronounced later in the year. There does not seem to be enough confidence in this opinion yet, though, to lead to speculative buying. Machine scrap is also up a little, and $15 is offered for it. There is liable to be more of this material coming into the market shortly. The dealers are looking for more of the single purpose war machinery to come into the scrap yards as the firms that were using it get their settlements from the Government. It would be somewhat of a relief to the machine tool salesmen were the expectations of the scrap dealers to come true in good measure, and a large amount of the war machinery led off to the scrap yards.

The scrap metal trade in Canada should get along better when there is more shipping space to the Old Country. That is the big end of the business for some of the larger concerns, but since the outbreak of the war there has not been tonnage to take over scrap metal. Things are shaping so that there will be a reopening of the trade before so very long, and the general belief is that once this happens there will be good times ahead of the scrap trade in this country. They have had a pretty barren row for the past six months. In fact there has been little doing in their line of business since the signing of the armistice.

At the present time there is little buying from the yards as neither the steel mills nor the foundries are taking in any stock, apparently being well supplied for the present needs, which are not by any means heavy.

The Steel Trade

Orders coming in for plate, bars, etc., are not by any means heavy. As a matter of fact it can all be summed up by saying that the trade in general is buying just what it has to buy and no more. When this class of business is going on there is something else that usually accompanies it, and that is that the orders are wanted at once. There is practically little or no buying going on now that can be properly classed as the old-time warehouse trade that used to make up the volumes of business that spelled something pretty close to capacity and good ties for the rolling mills. It hardly seems likely that prices will break much in such an atmosphere, as the mills are likely to see that there is only a limited amount of business to be had and figure that their best plan is to make as much money as possible out of it.

POINTS IN WEEK'S MARKETING NOTES

Scrap metal market is still very dull, but there is some improvement in copper, which seems likely to continue in line with the belief that copper will be higher at the close of the year.

There are chances of machinery scrap becoming stronger as quotations are up slightly. Now that the firms are getting settlements with the Government it is expected that some of the shell shop stuff will be scrapped.

Dealers report that supply business is fair. Auto shops and railroads are the chief buyers.

Pittsburgh reports have stated that the mills are not now handling sufficient business to guarantee over 55 per cent. of capacity.

Warehouses in this district are not buying material in quantities as they did before. There is not the demand yet and the houses show no signs of storing much material against a possible revival.

Montreal business, with the opening of navigation, shows signs of improvement.

CHEAPER ELECTRIC WIRING

A special committee of the Institution of Electrical Engineers (Great Britain), has been formed to consider the revision of the existing rules for electric wiring in buildings. This committee is the outcome of a growing conviction that the high quality of British cables and accessories justifies a relaxation of the standards hitherto imposed. During the war an enormous number of army buildings have been wired on the surface and in other ways not consistent with standard British practice, and the experience that is gained will be turned into account in cheapening the cost of installation and materials. British manufacturers of wires, switches, insulators, and other accessories will thus be led to expand the production of types which will be peculiarly adapted to meet the needs of overseas markets. Satisfactory quality will be ensured by the National Electric Proving House which is about to be established in Great Britain. The Proving House will put the hall mark of good design, material, and workmanship on every class of electrical apparatus, thus giving British productions the full benefit of the high reputation they have always held.

APPARENTLY NOTHING TO PREVENT RETURN OF AN OPEN STEEL MARKET

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., May 22.—The steel market continues to drag. There may be a slight improvement in sports, but it would require a very large improvement in buying to do any good, when even the present 55 per cent. operation of steel mills is based chiefly upon old orders, current orders accounting for only between one-third and one-half of the production.

Pig Iron

More than half the merchant furnaces in Western Pennsylvania, the Mahoning valley and the lake front district of Ohio are idle. The furnaces have been blowing out steadily, one after another, and the end is not yet. This makes it that the few furnaces remaining in blast have a good demand for their iron. The buying is all in small lots, usually single carloads, as buyers will not take any chances with prices. This, however, makes the business easier for the furnaces since the price is not much of an issue. When a consumer wants only a carload he does not haggle over the price. The furnaces are not piling iron, at least to any extent, and the situation in this respect is illustrated by the case of one merchant furnace interest which has a stack making a well-known brand of foundry iron, and desires to blow the stack out for relining, but must first accumulate a stock to take care of trade meanwhile. The furnace would work better with its new lining than it is working now.

Pig iron consumers likewise are not accumulating iron, but rather have been drawing upon stocks, chiefly iron they had to take on contracts. Sales of foundry coke indicate that the melt of iron is greater than a month or two months ago.

There are various rumors of price concessions on pig iron, but nothing definite is established as to prices below those that became effective March 21. As to the local Pittsburgh market, however, there is a slightly easier position, in that some furnaces that have lower freight to Pittsburgh than the rate from the valleys to Pittsburgh will give away their freight advantage, something they will not do when there is a strong market. Thus the regular valley market on foundry iron is $26.75, furnace, which with $1.40 freight to Pittsburgh, would make the Pittsburgh price $28.15, but there is a furnace interest with $1.10 freight to Pittsburgh, which will sell at $26.75 furnace, making the cost delivered Pittsburgh $27.85. Other valley prices are: Bessemer, $27.95; basic, $25.75; malleable, $26.25; forge, $25.75. If there were inquiry for any sizable tonnage these prices would probably be cut.

Steel

There is hardly any new inquiry in the market for either billets or sheet bars. There are rumors that sheet bars have sold at $2 to $3 under the recognized quotations, but these rumors cannot be confirmed. Most mills will allow a brokerage to middlemen, but the amount is not large enough to justify the middleman splitting the commission with the consumer. Specifications on long term billet contracts are very light, and on sheet bar contracts they are quite moderate, representing 50 to 60 per cent. of normal. Regular quotations remain at $38.50 for billets, $42 for sheet bars and 2-inch billets, and $41 for slabs, f.o.b. mill, Pittsburgh or Youngstown.

Finished Steel

Regular prices are: bars, 2.35c; shapes, 2.45c; plates, 2.65c; blue annealed sheets, 10-gauge, 3.55c; black sheets, 28-gauge, 4.35c; galvanized sheets, 28-gauge, 5.70c; plain wire, 3c; wire nails, $3.25 per keg, base; merchant steel pipe, basing discount 57½ per cent. In general these prices seem to be well maintained, but there are rumors of considerable shading in wire, and of some shading in sheets.

Buyers' Attitude

There is little opportunity to determine the attitude of buyers as to prices. Nearly all the time there is a controlled market in steel, as there is at present, and buyers are trained to pay the price or do nothing. The buyer probably feels he has only two alternatives, to pay present prices or wait until lower prices develop. Jobbers and manufacturing consumers are buying sparingly, taking only the material they must have. As to steel for construction purposes, which is usually the heavy end of the steel demand, there is practically none in the market. A large amount of work has been figured on by the engineering and construction firms, but there is no disposition on the part of the investor to go ahead with the projects. Many jobs have had all the engineering work done and are in shape for quick action whenever favorable conditions arrive. One of these, of course, is an open market for steel, a market that would give the buyer confidence, but there are other influences holding back the investor, particularly the fact that the peace settlements have not been made.

Producers' Attitude

The view of steel producers is that they would lose by throwing the market open, that there would be a decline in prices more than sufficient to balance such increased business as would result. They hold that the time is not yet ripe for a general buying movement. No steel producer is willing to predict that the time will be ripe before summer, which means that next fall is the earliest time, and many predict that there will not be really good business until next year. That means, of course, that the producers are willing to peg along with such orders as have to be placed, plus such old orders as remain on books. There was an average of 77 cent. operation in March, and 65 per cent. in April, while the present rate seems to be about 55 per cent., and June may show an average of 45 per cent., with still lower operations in July and August. With such light operations production costs are, of course, exceptionally high, but if prices were lower and there were only a slightly greater demand the mills would be worse off, in point of total earnings, than at present.

For weeks past the steel producers have insisted that there is "an open market" for steel products. On April 1 the Attorney-General rendered an opinion that the Industrial Board plan of "price stabilization" was illegal, but the opinion was not given to the public until after the resignations of the members of the Industrial Board were accepted, on May 9. Undoubtedly the steel producers had prompt knowledge of the Attorney-General's opinion and, in the circumstances, would be prompt to disclaim any allegiance to the Industrial Board plan. This left it, however, that while, technically, there is an open market, since there is no authority for anyone to dictate prices, there is practically a controlled market through the steel producers individually adhering to the recognized quotations, just as they have done in past years in more or less similar circumstances. The producers claim this is not illegal, the substance of the argument being that the producers do not agree to maintain prices, they merely do maintain prices.

SCRAP METAL MARKET SHOWS LITTLE CHANGE—PRICES ARE FIRM

AS in the pig iron market, there is a better tone prevailing in the scrap market. While prices are still at the low level, they are holding firm. Reports from the various U. S. districts follow:

Chicago—Trading is confined to dealers who require scrap to fill contracts and while quotations have declined, they have not reached the low levels of the early part of the year. The railroads continue to put a large quantity of material on the market, this week's offerings amounting to over 12,000 tons.

New York—With a great amount of uncertainty over future conditions, prices have not changed, except in the case of wrought pipe scrap, which dropped 50 cents. There is little business doing, and very little interest shown in the market.

Pittsburgh — Little business, but prices holding well, is the report from this centre. A number of furnaces being out of blast, and the largest consumer being out of the market, narrows the field considerably. There are but few transactions in heavy melting steel, the price remaining at $15.50 to $16.

Buffalo—Cast scrap is in demand in this district, and turnings and borings are being asked from outside. Actual business is small. The Government is reported to be about to put a large quantity of steel rails on the market.

Cleveland—There has been practically no business during the past week, and prices have remained unchanged. The general opinion is that after a few weeks of uncertainty there will be a general upward movement. Now that the market is free from political interference a resumption of trading is looked for.

Cincinnati—Nothing has occurred to change the level of prices during the past week. Cast iron borings are quoted at $8 per ton in carload lots. Steel turnings are quoted from $7.50 to $8.

St. Louis—Railroads are offering large quantities of scrap, the largest in some time, but the response is weak. There have been some sharp drops in scrap, prices coming down from 50 cents to $8, this last being on heavy relayers. Railroad offerings amounted to 10,000 tons, which buyers will likely get at their own price.

Philadelphia—Steel works are using low phosphorus as heavy melting steel and prices on the latter are now quoted at from $14.50 to $15.50 delivered. The market is generally dull. Shell steel scrap is now being delivered as heavy melting steel.

SLIGHT IMPROVEMENT NOTED IN THE PIG IRON MARKET FOR THIS WEEK

THERE seems to be a feeling of optimism in the market this week, the tone of the market being brighter in all districts reporting. A sale of 10,000 tons foundry iron lends some basis to the feeling. The reports from United States points follow:

Pittsburgh.—Notwithstanding a strictly limited field of both inquiry and sale, prices hold firm. The reason for this may be said to be the fact that production is very light, while stocks are being depleted from yards fairly steadily. The opinion of the trade is that prices have as good a chance of going up as of receding. The Carnegie Steel Co. have cut out three more furnaces, making a total of 33 down out of 59.

Boston.—With the passing of Thursday inquiries became more active and a better sentiment prevailed. There is considerable activity in the textile industry, and this presages a more active demand from makers of textile machinery. Enquiry for over 1,500 tons foundry and malleable for last half shipment is reported.

New York.—Business for last half has commenced to show itself. Most of the Eastern makers are now quoting on a furnace basis, at slightly higher prices than the schedule. Enquiry for prompt shipment has been brisk, and for last quarter about 1,500 tons has been asked for. Sales during the week were better than for some time past.

Philadelphia.—There has been an aggregate sale of 10,000 tons foundry iron during the past week, all for prompt shipment. Prices continue to vary and dealers do not want to take business further ahead than 60 days. The probabilities are that more furnaces will be blown out shortly. Low phosphorus is quoted at $35 per ton.

Buffalo.—With better reports of both sales and enquiries a better tone prevails. Foundry and special iron are in greater demand, and there is a change for the better in shipments. Another furnace in this district is being blown out this week, the firm having sufficient stock on hand to take care of their customers.

Cleveland.—Dullness, with small enquiries running to carload lots, and some sales of the same quantity is all that is moving this week. Furnace shipments are running to from 60 per cent. to 80 per cent. of capacity. An enquiry from New York for 10,000 tons Bessemer for export has been in the market this week.

Chicago.—There is a good deal of buying in small quantities, and the foundry yards are using their stocks up pretty quickly. It is hard to say how they really stand for iron, as there may still be material coming to them on unfinished contracts. Present indications are for a further period of dullness.

MR. P. M. LAING.

Recently Toronto Branch Manager of Herbert Morris Crane & Hoist Co., now appointed Toronto Representative of Jones & Glassco (Reg'd.), Power Transmission Specialists.

Jones & Glassco, Reg'd, announce the appointment, as their Toronto representative, of Mr. P. M. Laing, recently Toronto branch manager of Herbert Morris Crane and Hoist Co. Mr. Laing has had broad experience in the engineering field, particularly as applied to transmission appliances and equipment, having been for a number of years connected with the Positive Clutch and Pulley Works, and also the Elmira Machinery and Transmission Co. This experience, combined with several years' architectural, engineering and industrial study of applications serving a wide clientele, has earned for him a highly respected connection both in Toronto and throughout Ontario. A call at the Toronto office, located at 1203 Bank of Hamilton building, will find Mr. Laing ready to respond to all enquiries of the well-known firm of Jones & Glassco Reg'd, in the power transmission field.

Cincinnati. — The price stabilizing plan has had no effect on the pig iron market here. There is an absence of enquiry that would tend to make an open market, and furnaces are sticking to the recommended prices. There have been some orders taken for shipment before July 1st at prices below the schedule. Beyond July 1st nothing is reported.

St. Louis.—A few carload lots for prompt shipment was the extent of the trading this week. Further curtailment of production is being carried out in the hope of stimulating buying. For the third quarter some small enquiry is reported.

Birmingham.— A little better tone is evident here due to a few good enquiries for a fair tonnage. There is but little business, and further curtailment of stacks in operation is reported.

BIG ORDERS FOR MACHINE TOOLS ARE PLACED IN NEW YORK MARKET

Special to CANADIAN MACHINERY.

NEW YORK, May 22.—The E. W. Bliss Co., Brooklyn, has purchased more than $300,000 worth of machine tools—large planers, lathes, shapers, slotters, etc., and about $100,000 worth of large capacity cranes during the past week, this constituting the greatest amount of buying by any single company in the New York market since the end of the war. This equipment is for an addition to its plant which the Bliss Company is building. From this the machine-tool trade takes renewed hope that the many plans for manufacturing expansion which are under consideration will soon culminate in more general machine-tool buying. As has been repeatedly stated in these letters, the trade has believed that eventually a large business would develop. This has been indicated by the great number of inquiries, a large majority of which are still pending.

Inquiries have been about equally divided between domestic and foreign trade, but the indication now is that domestic business will go ahead much more quickly than export trade. Considerable export business which is pending will, however, go ahead in all probability as soon as the peace treaty has been signed and adequate financial arrangements for the various European countries have been arranged, particularly for France, Belgium and Italy.

One result of the recent convention of the National Machine Tool Builders' Association at Atlantic City, N.J., may be to check further reductions in prices. It is reported that some of the manufacturers who cut their prices the deepest may make slight increases, though no action has been taken as yet to confirm this. The attitude of the association clearly was that some prices had been reduced more than is justified by present conditions. The president of the association, A. E. Newton, of the Reed-Prentice Co., Worcester, Mass., pointed out in his opening address that profits on machine tools before the war were often inadequate, and he made the further statement that some of the machine-tool builders do not figure their costs closely enough or they would not reduce prices further than they have already gone.

The Bureau of Aircraft Production, War Department, is continuing to offer new and used machine tools, nearly 400 now being on sale at Buffalo from the plants of the Pierce-Arrow Motor Car Co. and the Curtiss Aeroplane & Motor Corporation. Most of these tools have never been removed from the shipping crates. The bureau is selling the tools to the highest bidders, reserving the right, however, to reject unsatisfactory bids. More than 600 tools from the plant of the Union Switch & Signal Co., Swissvale, Pa., have already been sold. A part of the equipment of the Wright-Martin Aircraft Corporation at Long Island City, N.Y., will doubtless be offered for sale soon, though a part of these tools may be retained to manufacture motors for the aviation branch of the War Department.

Several of the automobile plants in the East are figuring on new equipment and some plants which were engaged in making shells and other war munitions may engage in some phase of automobile manufacturing.

Altogether, it may be said that prospects in the machine-tool trade continue to look brighter, although the actual increase in business is not yet worthy of any special note. One feature which is pointed out is that there is a better demand for tool-room equipment, and this is usually a forerunner of active buying of manufacturing tools.

During the next 30 days the peace treaty may be signed; Congress may provide funds for the railroads, and some of the shipyards may show increased activity, due to the permission granted by President Wilson to take foreign contracts. All of these factors will have a favorable influence upon machinery business.

TENDERS

Tenders for the erection of a central fire hall for the city of Welland will be received up till 4 p.m., June 3rd, 1919. Plans and specifications can be seen at the office of W. W. Lachance, architect, Temple Building, Welland.

The city of Toronto is calling for tenders for copper wire, battery couples and battery plates. Tenders will be received up to May 27th. Two motor cycles are also called for, the whole being for the fire department. Specifications and applications can be obtained at the Fire Department, Adelaide Street, Toronto.

The Department of Indian affairs is calling for tenders for a school at Tyuendinaga Indian Reserve, and tenders must be endorsed "Tender for School at Tyendinaga Indian Reserve" on the envelope. Plans and specifications can be obtained at the office of the Indian agent, Deseronto, and at the post offices at Belleville, Napanee and Trenton, and the department at Ottawa. Tenders will be reserved up to May 28th.

Tenders for the erection of an extension to the revetment wall at Fort William, Ont., will be received at the office of the Department of Public Works, Ottawa, up till June 5th. Tenders must be accompanied by a cheque to the amount of ten per cent. of the amount of the tender. Plans and form of contract can be obtained at the Department, at the offices of the district engineers at Fort William, Equity Building, Toronto, and Shaughnessy Building, Montreal.

Winnipeg. — Sealed tenders marked "Tenders for Pumping Engine" will be received by the undersigned up to 4 o'clock p.m. on Tuesday, the 3rd day of June, 1919, for the supplying of a 100 h.p. 6 cylinder motor, combination pumping engine and hose car, capacity 600 gallons "Imperial measure." Parties tendering to state price delivered at the Fire Hall, Berry St., St. James. Said engine to be provided with 26 feet of soft suction hose with coupling to attach to hydrant of Winnipeg standard thread. For further particulars apply to Fire Chief Dickson, at the Fire Hall, Berry Street, St. James. — FRANK NESS, Sec.-Treasurer, Rural Municipality of Assiniboia, Kirkfield Park P.O., Man.

PERSONAL

James Mathews, vice-president of the Mathews Steamship Company, died at eight o'clock last evening at his residence, 114 Farnham Avenue, Toronto, aged 69 years. Mr. Mathews had been ailing for nearly a year. His death makes the first break in a family of four sons and six daughters left by the late James Mathews. The Mathews Company are the largest individual owners on fresh water and the oldest steamship company on the lakes. Mr. Mathews was a life member of Zetland Lodge, A.F. and A.M., and a member of the Royal Canadian Yacht Club, and the Toronto and Montreal Boards of Trade. He attended Heath Memorial Church. Being of a retiring nature, he had never taken a part in public life.

T. & N. O. Extension.—A party of 24 men of the Government survey has reached Cochrane in charge of W. R. Maher. They are to locate a route for the extension of the Government railway to Moose Factory. The party is made up of W. R. Maher in charge, W. J. Bishop, assistant engineer, and the majority of the men have seen active service at the front.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75

Toronto price:—
Silicon..2.25% to 2.75% $32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bas, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	9 25
Chequered floor plate, ¼ in.	9 00
Staybolt iron	8 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

	Per 100 lbs. C.L.	L.C.L.
Pittsburgh to Following Points		
Montreal	33	45
St. John, N.B.	41½	55
Halifax	49	64½
Toronto	27	39
Guelph	27	39
London	27	39
Windsor	27	39
Winnipeg	89½	135

METALS

Lake copper	$18 50	$18 50
Electro copper	17 50	17 50
Castings, copper	17 00	17 00
Tin	54 00	55 00
Spelter	8 00	8 25
Lead	6 50	7 50
Antimony	8 00	8 50
Aluminum	38 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 5 00	$ 4 50
Plates, 3-16 in.	5 50	4 90

Price List No. 38

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$10 50	$10 50
Copper, crucible	13 00	13 25
Copper, heavy	13 00	12 75
Copper wire	13 00	12 75
No. 1 machine composition	10 00	12 00
New brass cuttings	8 00	9 00
Red brass turnings	8 00	8 50
Yellow brass turnings	6 00	6 00
Light brass	5 00	5 00
Medium brass	7 00	6 00
Scrap zinc	4 00	5 00
Heavy lead	3-4	4 00
Tea lead	2-3	3 00
Aluminum	15 00	12 00
	Per Ton	
Heavy melting steel	9 50	9 00
Shell turnings	6 00	6 00
Boiler plate	10 00	8 00
Axles (wrought iron)	20 00	15 00
Rails	15 00	11 00
Malleable scrap	15 00	12 00
No. 1 machine cast iron	17 00	15 00
Pipe wrought	8 00	5 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	5 00	5 00
Stove plate	12 00	10 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	45
Elevator bolts	25
Machine bolts, 7-16 and over	25
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd., brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list plus	15
Burrs only, list plus	40
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	75
Wood screws, O. & R., bright	70
Wood screws, flat, brass	40
Wood screws, O. & R., brass	.5
Wood screws, flat, bronze	30
Wood screws, O. & R., bronze	27½

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. and Hex. Head Cap Screws	20
Rd. and Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plue net
Fin. and Semi-fin. nuts up to 1 in.	25
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto ..... net

MISCELLANEOUS

Solder, strictly	$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill	list plus 5%
At warehouse	list plus 25%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head, 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	7 95
Premier, 10¾ oz.	.....	8 25
Zinc sheets	20 00	20 00

PROOF COIL CHAIN B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	.....
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.	.....	45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	$0 43

WASTE

Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades ... 15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

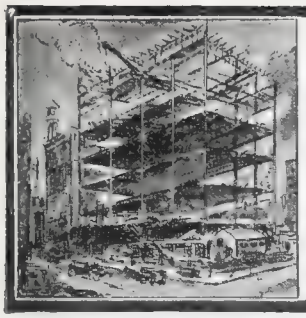
	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	-
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

A. R. WILLIAMS MACHINERY & SUPPLY CO. TAKE OVER NEW MONTREAL PREMISES

THE A. R. Williams Machinery and Supply Co., Limited, Montreal, took possession on May 1 of new premises at 320-28 St. James Street, Montreal. St. James Street can well be called the Machinery Street of Montreal, and the A. R. Williams Building has a most favorable location on this thoroughfare.

J. N. Robinson has charge of the new business, having gone to Montreal about a year ago. Prior to that, Mr. Robinson was for fifteen years in the Toronto office, having charge of the Hamilton territory. He is thoroughly familiar with every phase of the machinery business and is admirably qualified for the important position he is now called upon to handle. Associated with him are R. H. Harmer, secretary-treasurer of the company, also from the Toronto office; S. Norton, late sales manager of the Standard Machinery Co., also at one time with the Foss people; Mr. Baynes, formerly with the Rudel-Belnap Co.; Mr. Clarke, who will specialize in woodworking and general machinery, and A. Hopewell, who will have charge of the supplies department. Mr. T. A. Hollinrake, president of the Toronto organization, is also president of the Montreal firm.

It is the intention of the Montreal firm to follow the same sound lines that have been adhered to in the Toronto office.

It is 30 years ago since Mr. A. R. Williams first opened the office in Montreal, and when the A. R. Williams Company was organized in Toronto some five years later it was taken over. The development of machinery business in Quebec made it highly desirable that the company should have in Montreal a special organization, and business premises adequate to keep closely in touch with the trade there, and to that end the premises on St. James Street, formerly occupied by Williams and Wilson, have been secured. When some alterations are made the A. R. Williams Machinery and Supply Co., Ltd., will have in their new property in Montreal undoubtedly one of the most thoroughly complete premises on the continent for the handling and displaying of all classes of heavy machinery, as well as the various other lines.

It is the intention of the Montreal business to carry lines similar to those at the Toronto office, including Canadian made machine tools and the best American and Old Country lines. In fact they will cater to anything in the line of engines, boilers, steam equipment, water wheels, electric motors, machine-shop tools, boiler rooms, railway shops, shipyards, pulp and paper mills, saw mills, lath, shingle and heading outfits, contractors' equipment, mining, road-making machinery, gas engines and equipment, and other general lines.

NEW PREMISES OF A. R. WILLIAMS MACHINERY & SUPPLY CO., 320-28 ST. JAMES ST., MONTREAL.

TRADE GOSSIP

Henry Engineering Co.—The Henry Engineering Co. announce the formation of a company of three well-known gentlemen, experts in their various lines. Their offices are at 71 Bay Street, Toronto, where they are prepared to act as consulting engineers on general engineering lines. They will also specialize in the purchase and sale of power equipment, steam, electrical and hydraulic, both new and used. The company is composed of Thomas Henry, James A. Rumgay, and Edwin B. McBryde. Mr. Henry was for many years chief engineer of the Interurban Co., and the Erindale Power Co. Later he was associated with the sales department of the Toronto Electric Light Co. Mr. Rumgay was for some years with the Canadian Allis-Chalmers Co. as draftsman and estimating engineer. More recently Mr. Rumgay has been designing engineer and manager of the boiler department of the Polson Iron Works, Toronto. Mr. McBryde has been, since coming to this country, assistant distributing engineer of Toronto Electric Light, and later assistant sales manager. For the past two years he has been manager of the Fisher Electric Co., Toronto.

Outlook Is O.K.—"The demand for marine engines and boilers is quite large and activity in this department appears to be assured for several months at least. The shipbuilders of Canada have embarked on a fairly extensive program and until it is completed there will be active production of boilers and engines, etc.," stated Mr. J. E. Waterhouse, of Engineering and Machine Company of Canada. "The market for stationary boilers for land use is, on the other hand, not active just now. We are not worrying about the future, however. There is plenty of room for optimism."

JAMES POWELL

For 14 years Secretary of the Canadian Railway Club at Montreal. A presentation marked his retirement from the position.

MARK OF ESTEEM TO RETIRING SECRETARY

Canadian Railway Club in Montreal Hold the Annual Election of Officers

The seventeenth annual meeting of the Canadian Railway Club was held last week in Montreal, at the Windsor Hotel. During the past year the membership has increased from 883 to 1,100, and the financial statement shows the club to be in a very flourishing position. James Powell, who has been the club secretary for the past fourteen years, has resigned from the position, as his duties with the vocational classes in connection with the reestablishment of the returned soldiers prevents him from giving the proper attention to the affairs of the club. In recognition of his services and to show their appreciation of his genial and faithful efforts, the members of the club presented him with a solid silver epergne, suitably engraved. Past President Hudson was likewise presented with the gold past president's badge. The newly elected officers were:

President, J. Hendry, master car builder, G.T.R.; first vice-president, W. H. Winterrowd, chief mechanical engineer, C.P.R.; second vice-president, C. H. N. Connell, division engineer, C.N.R.; executive committee, A. Crumpton, G.T.R.; E. A. Nix, C.P.R.; B. F. Shortly, C.N.R.; E. R. Battley, G.T.R.; R. A. Pyne, C.P.R.; W. H. Sample, G.T.R. Audit committee, W. H. Langridge, C.P.R.; G. M. Wilson, G.T.R.; R. M. Harvey, Safety Car Lighting Co. Treasurer, E. E. Lloyd, C.P.R. Secretary, W. A. Booth, chief draughtsman of the Grand Trunk.

New York.—The Italian Government has ordered 150 locomotives from the American Locomotive Co. The locomotives are of the heavy freight type. The company has received enquiries from several other foreign Governments for locomotives it is stated.

Railway Board Can't Fix Ocean Rates.—The amendment proposed by J. E. Armstrong, of East Lambton, to give the Railway Commission control of inland water and coastwise navigation, including the fixing of rates, was defeated in a vote before the special railways commission. The majority was five against the amendment.

New Bridge for Niagara.—The New York Central are making a survey and estimate of cost for a new bridge over the Niagara River. Four points are being considered as crossings, two of which are at Grand Island, one at Strawberry Island, and the fourth being the enlarging of the present bridge of the Michigan Central below the Falls.

Big Thing For Goderich.—Further particulars are available regarding the great new industry planned for Goderich, to be known as the Lake Huron Steel Corporation, with $15,000,000 capital. J. J. Mahon, of Newark, N.J., who was the steel expert for the Imperial Munitions Board, confirmed the news of the plans. It is understood that he will be vice-president of the concern and in active charge of the practical side of it. The corporation expects to start work on its plant within two months. Though ultimately it is intended to carry the manufacturing process right through from the ore to finished steel products, at first the plant will be used for assembling work, such as is now done at many automobile and other works in this country. The company is in a sense an amalgamation of various steel and steel products companies, with a Detroit automobile, a St. Paul tractor and others interested. The capital will be largely from the United States. It is claimed that it will mean the manufacture in Canada of many millions' worth of steel products now imported.

AT LEAST TEN CONVERSATIONS NOW PLACED ON A SINGLE WIRE

BY means of Multiplex Telephony apparatus at least ten simultaneous conversations and several telegraph messages may be transmitted over a single copper wire for practically unlimited distances. Demonstrations of the wonders of the new invention were given a party of civic officials and newspaper men at the Strachan avenue Hydro plant at Toronto.

The demonstration is being carried on by the Canadian Independent Telephone Co. of Toronto, which has brought to Canada Dr. Lee DeForest, with a corps of DeForest Radio engineers and Prof. Charles A. Culvert of Beloit College. Major-General George O. Squier, Chief of Staff of the United States Army Signal Corps, is the inventor of "Wired Wireless," and Dr. Lee DeForest the inventor of the appurtenances which made its commercialization possible.

Four on One Wire

Over a single Hydro telephone wire to Dundas four newspapermen carried on conversations at yesterday's demonstration. Every word came clearly and distinctly, and there was no wire noise, such as is encountered on standard connections. On the Bell system there are thirty circuits from Toronto to Hamilton.

According to demonstrators of the "Multiplex Telephony and Telegraphy," with their apparatus nine hundred telephone connections can be made in addition to scores of telegraph connections. It would cost $1,000, they said, to install the apparatus from Toronto to Hamilton—much less when it is manufactured in commercial quantities.

"Viewed from the standpoint of public ownership," say the men in charge at the Hydro plant, "the Province of Ontario now owns several hundred miles of long-distance copper telephone circuits which are used only by the Provincial Hydro-electric officials and employees in the operation of the system. These inventions of Squier and DeForest, without interfering with the present use of the line by the Hydro-electric System, can be used to increase the use of these long-distance lines to many times their present capacity and the extra telephone circuits used for public telephone service.

"The Dominion of Canada has recently become owner of the G.N.W. telegraph system and of the Transcontinental telegraph system. These telegraph systems combined represent a very large expenditure of money, and at least part of the Transcontinental is equipped for both telephone and telegraph use. The invention would multiply the possibilities of these lines by at least ten times their present capacity."

Montreal.—The General Currie, built at the Dominion Shipbuilding Co.'s yards in Toronto, has arrived here to load for Great Britain. She was built for the Imperial Munitions Board, and was launched in March last.

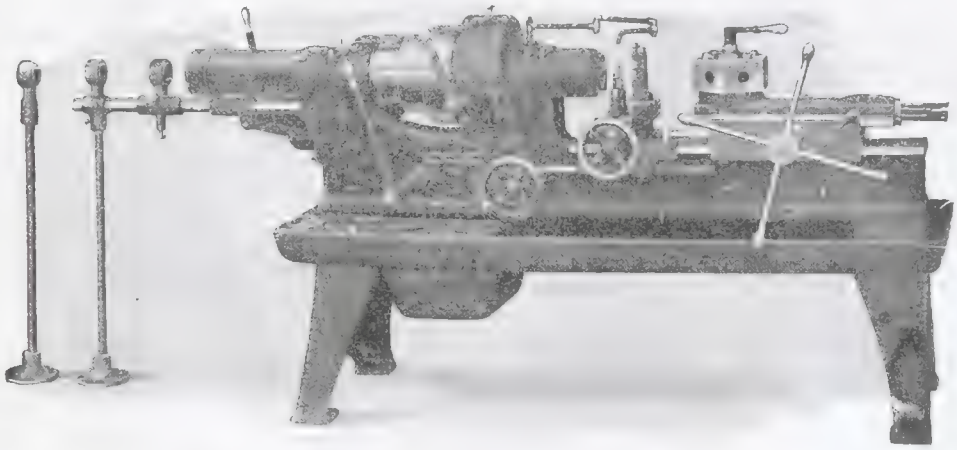
J. HENDRY

Master Car Builder of the G.T.R., elected President of the Canadian Railway Club.

Warner & Swasey Screw Machines

For large output and close limits—If you are figuring on screw machine work you can depend on W. & S. machines being right for the job.

We can supply you from stock immediately.



The A. R. Williams Machinery Company, Limited

ST. JOHN, N.B.
WINNIPEG, VANCOUVER

"If It's Machinery, Write Williams"

64 Front Street West
TORONTO

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

The Thos. Davidson Mfg. Co., Limited

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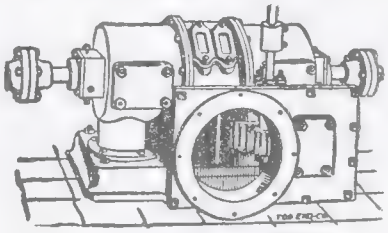
WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.

BELLEVILLE, ONTARIO

ENGINEERS DISCUSS VARIOUS POINTS IN CONNECTION WITH METRIC SYSTEM

THE merits and demerits of the metric system were discussed at a joint meeting of the Toronto sections of the American Institute of Electrical Engineers and the American Society of Mechanical Engineers, and the varied character of the discussion was indicative of the opinions held by these two branches of engineering.

The growth of the metric system was traced from its origin in the French Revolution, together with its gradual legalization in many of the European countries and in South America. While originally intended to represent the one forty-millionth part of the earth's quadrant, the standard meter is not in agreement with this original conception of the length, and a more accurate representation of its value is given in terms of the wave length of Cadmium red light.

The multiplicity of English weights and measures leads to an incalculable loss of time, and to the loss of considerable time in the schooling of the adolescent generations. In connection with the gradual penetration of the metric system, spoken of as desirable, it was pointed out that the best way of acquainting the general public in its use was to make use of it in the schools, training children in the use of both systems and making both equally familiar.

The fugitive decimal point was dealt with and the unwieldy numbers common to metric working drawings also came in for criticism. The decimal point on a blue-print is at best a nuisance, and on shop drawings and those used in the field is easily obliterated by the dirt and wear of everyday use.

The metric system is not, as may be supposed, universally used, even in the country of its origin, and in France the people and many industries still cling to the old weights and measures of their forefathers.

The munition business has done much to acquaint the manufacturers of the United States and Canada with the merits of the metric system. French guns and ammunition were both made to metric measurements by many firms without the slightest difficulty, and during the war the Baldwin Locomotive works made locomotives for the French Government to the metric system at no additional cost, the mechanics being supplied with gauges, etc., to metric scales. The present trend to the metric system was shown in the recent action of the wholesale grocers in the United States, who are recommending the printing of the metric equivalent and the English measure, together on all packages, thus familiarizing the general public with its nomenclature. This action will, undoubtedly, have a far-reaching effect.

In the field of export conflicting opinions were expressed. While the systems in general use in foreign countries have no uniformity, it is to be expected that diverging views should be held. Exporters to countries where the metric system is in common use, undoubtedly would be benefited by its use, while on the other hand, those exporting to countries, particularly in South America, where it is legal, but not universally adopted, find no difficulty in marketing their goods according to English weights and measures. In fact, some of these countries have brought their weights and measures into line with the English systems.

The adoption of some rational decimal system for English weights, measures and coinage would be extremely beneficial. In the dimensioning of drawings for such materials as armature punchings, it is, of course, customary at the present time to say, 12 inches plus or minus, a few thousands or ten thousands, otherwise the mechanic would get busy with his two-foot rule instead of using his mikes.

The enormous expense and difficulty of the transition period will undoubtedly greatly deter the adoption of the metric system in the machine shops and in those industries producing standard and interchangeable mechanisms. The production of mechanisms to metric dimensions offers no great difficulty, as may be illustrated in the fact that the Sunbeam aeroplane engine was manufactured in large quantities in Toronto to metric sizes. In this case, however, all metric measurements were transformed into English measurements, being carried to the nearest ten-thousandth. The machine tools in use at the present time would do equally well for production in one system as in the other, but it is in the making of jigs, fixtures and gauges that the greatest expense would be involved. New jigs, gauges, and, where stampings or forgings are involved, costly dies would be required and the old ones kept for replacement.

The automobile may be cited as one instance of this difficulty. It would be easy enough for a maker, turning out an entirely new car, to use metric measurements, but the transition from one system to the other, in the case of a maker already marketing a well-known line, would be costly and would involve considerable inconvenience to the public.

The transition period would create many other troubles, for instance, in the pipe-fitting trade. Two standard lines of pipe would have to be carried, one metric and one English, and pipe fittings numerous enough as it is would be multiplied enormously. An ordinary pipe tee would have to be stocked in five times as many sizes as at present to allow for interchangeability.

The electrical industry would have much to gain from the adoption of the metric system, as in the design of electrical apparatus both systems are in common use at present, with the metric system the more predominant. Electrical theory is, to a large extent, even in its practical applications, founded on the C.G.S. units, and much laborious calculation and the use of troublesome conversion constants would be avoided.

It is idle to suppose, that in the present state of the world's labor market, such a change could be accomplished without friction and trouble. It is doubtful if the average workman would take kindly to an innovation which would necessitate his acquiring a new system of measurements. The best way to introduce a new system to the inhabitants of any particular country would not be to make it compulsory, but to make the old system illegal and to make it the more difficult of the two to acquire and use.

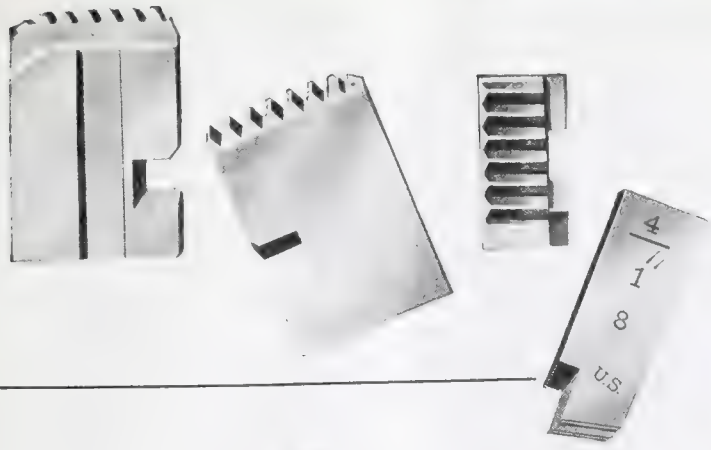
One important point developed in the course of the discussion had to do with the advantages a country at present using the metric system would have over one using the English system if the latter adopted the former system. With mechanics trained in the metric system and with the whole population acquainted with its use, the country familiar with it would undoubtedly be in a greatly superior position as regards export trade and would have an advantage even as regards competition in the home market of the country just changing over.

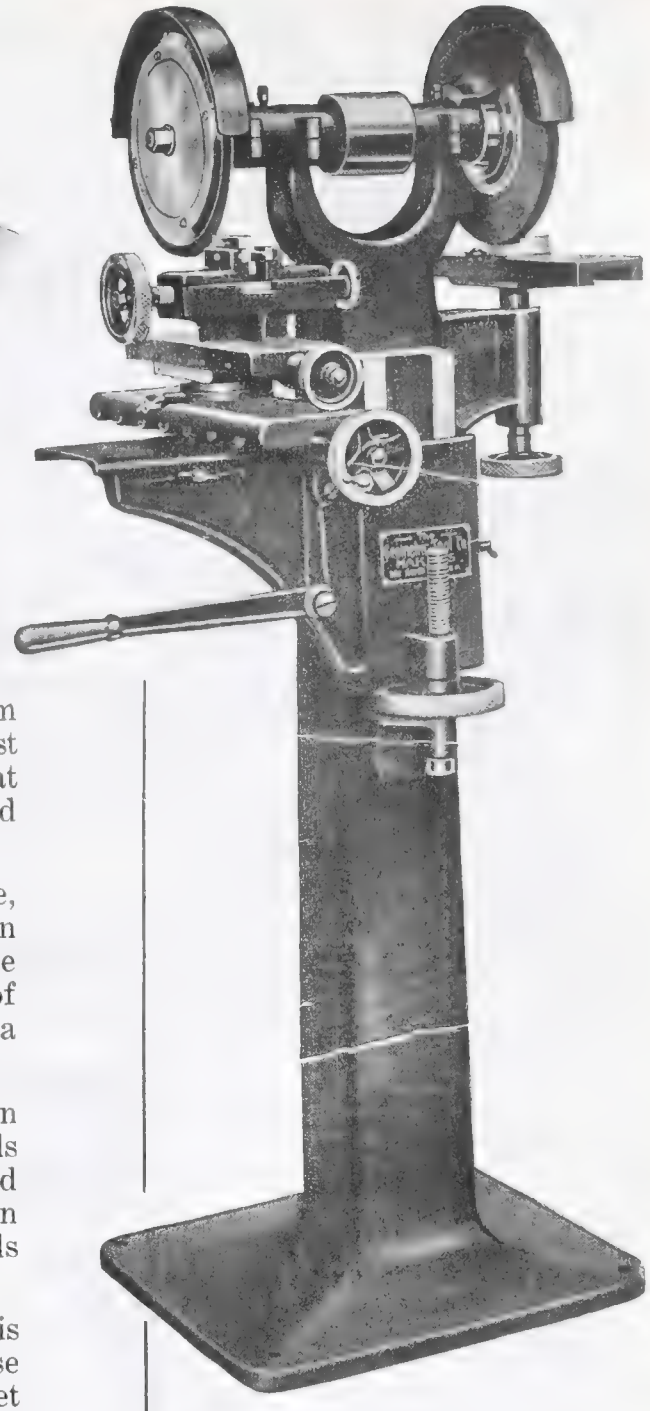
SULPHUR MARKET IN FRANCE

Investigations into the local market discloses that there is at present no market for sulphur products in France, according to a Consular statement, and, in fact, the same condition appears to hold for all of France in any large commercial way. This is due to the fact that the French Government controls the buying and distribution of these products. In commerce, sulphur products are used in this connection with the vine-growing and wine-production business. In regard to copper sulphate, the Government has purchased a large quantity at a high figure, nearly enough for next season's needs for all of France, and, it appears, will not let down the bars for importation until its contracted stock is disposed of.

SHIP PRODUCTION IN 1918

Outside of Germany and Austria-Hungary, the shipyards of the whole world during 1918 produced 5,477,444 gross tons of merchant shipping, as given in the annual summary of Lloyd's Register of Shipping. This is 63 per cent. higher than the total in the year 1913, which held the record for construction, and included the output of Germany, Austria, etc. The total for the United Kingdom in 1918 was 1,348,120 gross tons, and the output for the United States was 3,033,030 gross tons, which is equal to that for the ten years 1907 to 1916 in the United States, and half of this was built on the Pacific Coast. Of the United States total output of 3,033,030 tons, about 1,000,000 consisted of wooden ships.





Sharp Chasers Cut Clean Threads

Accurate, uniform threads result only from dies which are maintained in the highest state of cutting efficiency. This means that chasers must be kept sharp, and ground uniformly.

Even if just touched up from time to time, the chasers respond splendidly, with clean threads. And with this machine — the Geometric Chaser Grinder—the matter of keeping threading tools up to scratch is a comparatively simple matter.

Various makes of chasers can be ground on this adaptable machine. The two wheels permit the easy grinding of both milled and tapped chasers. In addition, the plain wheel lends itself readily to various kinds of tool grinding.

Uniform grinding of a set of chasers is purely a mechanical matter through the use of adjustments which can be accurately set to govern the grinding of an entire set of chasers.

The Catalog describing this machine is a mine of information on chaser grinding. Write for it.

THE GEOMETRIC TOOL COMPANY

NEW HAVEN **CONNECTICUT**

Canadian Agents:

Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Toronto, Winnipeg, St. John, N. B.

Service Quality

Steel of Every Description for Every Purpose

"HAWK" VANADIUM TOOL STEEL

This steel is the finest quality of straight carbon tool steel that modern crucible practice can produce. Only the finest raw materials are used and these are treated throughout the manufacturing process in a manner which **means money** to you.

Can be furnished in all tempers and finishes to meet your requirements.

Large stock. Prompt shipment. For full particulars, write.

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PLEWES Limited
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For All
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CASTINGS
Medium Weight Grey Iron, Brass, Etc.
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GREENLEAFS, LIMITED
Belleville, Ontario

TRADE GOSSIP

Toronto Saves Money.—The saving to the city of Toronto, due to their fighting the rate increase of the Bell Telephone Co., amounts to $440,000. The reduction of the rate increase in 1919 from 20 to 10 per cent. makes a saving of $250,000, while the refusal of the installation charge amounts to $40,000. The saving due to the whole increase being delayed six months is $150,000.

Increase Pensions.—The C. P. R. directors have decided to grant a special allowance for a period of at least 18 months, of an increase of 25 per cent. on all pensions to officers and employees now on the pension roll. This action was taken with the realization that the higher cost of living justified the extra allowance. The annual amount now paid out to pensioners was upwards of $267,000.

BLACK DIAMOND OVENS
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Buy Asphalt Plant.—At a meeting of the council of Charlottetown, P.E.I., a short time ago, Councillor McKinnon reported that it had been found advisable for the city to purchase an asphalt plant. This would enable the city to make its own pavings and to do as much work as they were able each season. None of the firms he had been in touch with would consider coming for less than a $100,000 contract.

Foreign Markets for Canada.—The Canadian Commissioner for Trade, in a message to the Government, gives particulars of markets that are open to Canadian producers. These include markets in Norway, Sweden, Denmark and Hollond. The list covers wheat and grain, fodder, cheese, canned goods, chemicals, minerals, agricultural and industrial machinery, paints, wire and wire rope, boots and shoes, leather and automobiles and cycles, binder twine and rubber footwear.

Placing Returned Soldiers.—Since the inception of the Government Employment Bureau at Guelph in March last, it has been instrumental in placing 210 returned men in positions. Most of these men found places in the city. 232 civilians have also been placed, most of these being also being fixed up in the city. There is a good demand for labor at present, both in the factories and on the farms. One firm outside of Guelph wrote to the bureau asking for 50 men for factory work.

Will Continue to Act.—The Montreal Metallurgical Association, which was formed in 1915, as a war factor in connection with the more efficient operation of munition factories, will now continue its activities on a permanent basis. This was decided at a recent meeting of the council. Dr. A. Stansfield, the founder of the association, has retired from the presidency, and G. Percy Cole has been elected to that office. H. J. Roast is vice-president, and Capt. J. G. Ross is the new secretary.

April Fire Losses.—Fire losses in Canada during April totalled $850,000, where the damage was $10,000 or more, according to a summary made by the New York "Journal of Commerce." The losses by fire for the United States and Canada were considerably smaller than was the case for April, 1918. The largest fire reported during the month was at the wire and cable plant, in West Toronto. One other fire occurred where the damage exceeded $100,000; this occurred in the railway yards at St. Boniface, and forty cars of grain and coal were destroyed, involving a loss of $105,000.

New Trade Service.—The establishment of a monthly shipping service between Canada and Roumania was decided upon recently and the first sailing from Montreal has been announced for some time in the latter part of this month. The exact date will be an-

nounced later. The business secured by Canadian firms with Roumania led to the decision to inaugurate this service. The steamship Jiul on its arrival from Liverpool will load for the voyage to South-Eastern Europe. The merchandise to be carried will consist of the material to be used for reconstruction. The extending of credits through the Canadian Trade Commission is the cause of the direct steamship being established. The vessels will call at Greek ports.

To Aid Education.—Federal support for technical education aggregating ten million dollars within the next ten years, the money to be paid to the provinces, is provided for in the following resolution, of which notice has been given by Hon. J. A. Calder, Minister of Immigration and Colonization: Resolved that it is expedient—(1) To bring in a measure for the promotion of technical education in Canada. (2) That for the purpose of promoting and assisting technical education in Canada, sums, aggregating ten million dollars, shall be appropriated and made available for payment out of the consolidated revenue fund of Canada, during each fiscal year for the period of ten years, beginning with the year ending March 31, 1920.

MARINE

Collingwood.—The steamer City of Meaford, owned by the Collingwood Steamship Co., was totally destroyed by fire while lying at the wharf on the west side of the harbor. The steamer was valued at $12,000, and was partly insured. The fire is said to be due to an incendiary.

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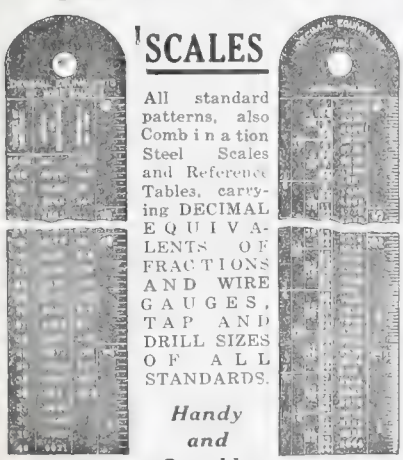

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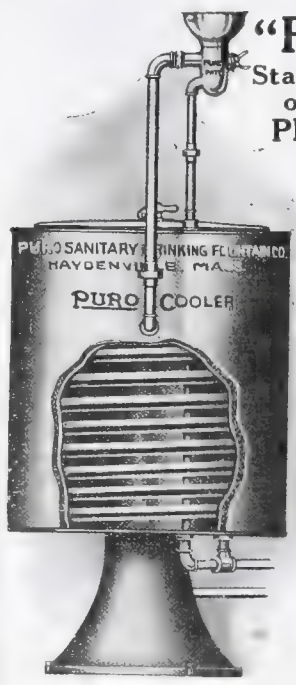

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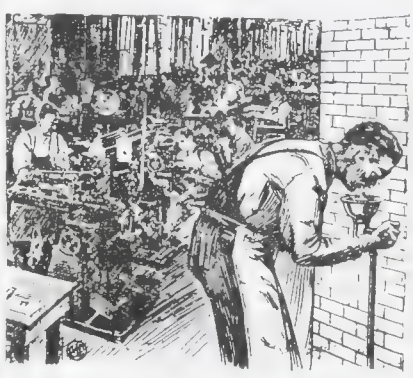

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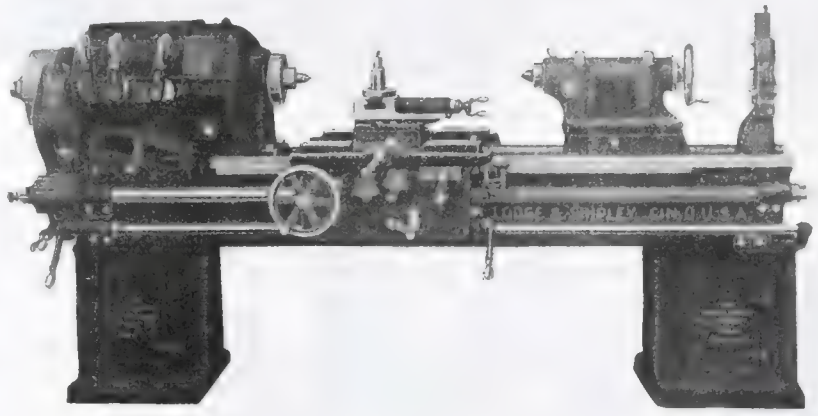

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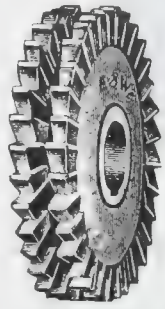

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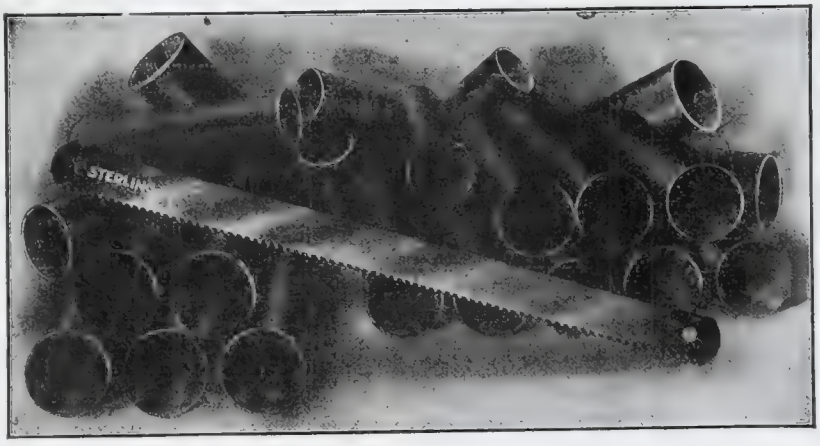

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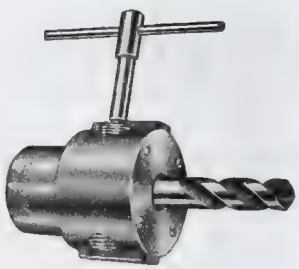

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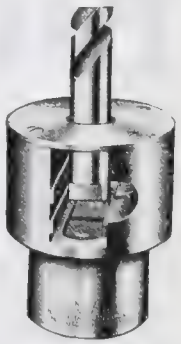

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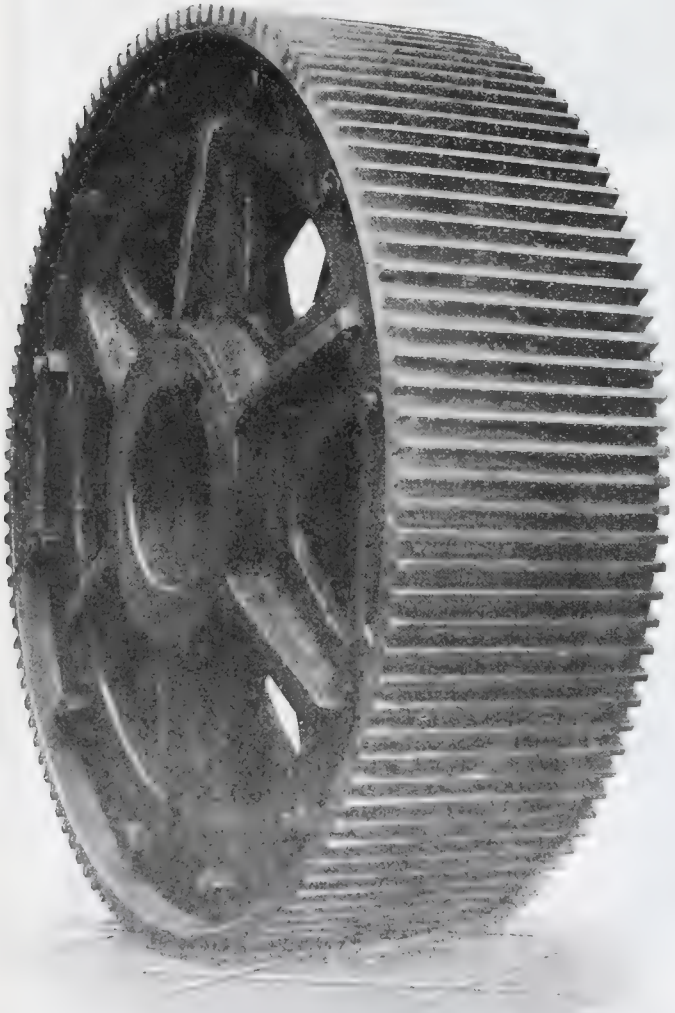

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SPEAKING at Leeds, England, the other day, Lloyd Harris, chairman of the Canadian Trade Commission in London, said: "Canada must no longer be thought of simply in terms of prairies, but in terms of factories. The economic effect of the war had been to change Canada within four years from a primarily agricultural to a predominantly industrial country. In the year ending March, 1914, the value of exported manufactures was $57,000,000, against agricultural exports valued at $198,000,000. In the year ending March, 1918, the value of exported manufactures was $636,000,000, against the value of exported agricultural products of $567,000,000."

U.S. Firms to Conduct Export Trade from Canada

The announcement from Detroit that the Maxwell Motor Car Company is planning to conduct its entire export business from Windsor, and that $6,000,000 will be spent in the next eighteen months on extensions and new construction work at the plant at Walkerville, is only one of a number of contemplated industrial developments which reflect the importance of Canada's favorable trade relations with Great Britain. And in this connection the recent arrangements effected through the activities of Lloyd Harris and the Dominion Trade Mission are significant.

The Financial Post Informs You Early on Business Developments

Canada is gradually going forward into vastly greater industrial development. It will pay you to keep in close touch with the whole Dominion in this respect. For this purpose THE FINANCIAL POST is undoubtedly the paper for you. The information given above is from THE POST of April 12th (Special Insurance Issue). Here are a few more titles from the same issue:—

Advances for the Industrials Recent Feature
Discriminate Use of Pruning Knife in Tariff
Nearly $1,000,000 for Canadian Shoes
Montreal Cement Co. to Erect Big Plant
Canadian Trade Commission Gets Big Timber Order
Millers Seek Assistance of Government
Globe Attitude on Abitibi Paper is Bolshevism
Steel Industry Unsettled by Price Fixing
People Must Discharge the Debt of the Nation
Railroads for Tariff Commission
Ames, Holden Dividend in Sight
Dividend Near for Atlantic Sugar
Dominion Iron Making Claim to $21,000,000
Montreal Power Refuses to Bow to Union Demand
Goodwins Show $34,000 Gain in Gross Profits
Business Ideas in Financing Stock Raising
Reserve Bankers Favor Canadian Bank System
Can Sir Adam Beck Run Toronto? (Editorial)
Purchasers of Manitoba Bonds are Disclosed
Moose Jaw had Surplus from 1916 Operations
March Building Permits Show Good Gain Over 1918
House Demand in Toronto is Very Brisk

INSURANCE SECTION

Enormous Expansion in Fire Insurance
Marked Growth of Automobile Insurance
Burglary Insurance Co.s Meet Heavier Losses
Life Companies Swamped With New Business
Actuaries Favor 'With Profit' Life Policies
Advantages of Commercial Life Insurance Recognized
Business Grows in Employers' Liability Field
Important Part Played by Current Surplus Earnings
Influenza did not Boom Health Insurance so Much
Fire Co. Stocks may be Very Lucrative
More Demand for Mortgage Loans is Taking Place
Types of Policy that Have the Call

Business Building News Items Appear Each Week in *The Financial Post*

The above are only a few of the many subjects of real profit-making interest to Canadian men of affairs which have been dealt with by expert writers and editors in THE POST of April 12th. THE POST will keep you informed on Canadian business matters in a way unrivalled by any other publication. Send for a subscription to-day. The price is $3.00 per year, and you have only to fill in this form:

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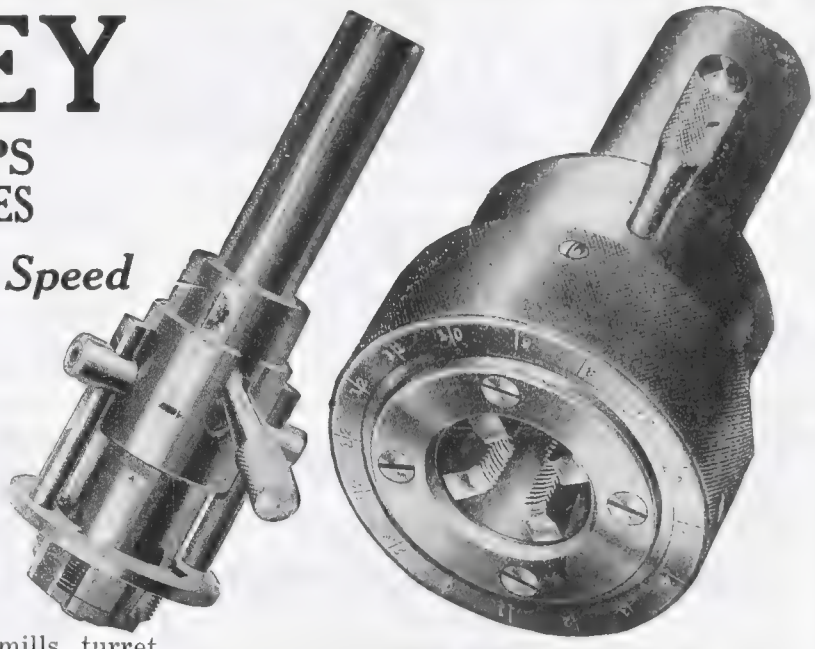

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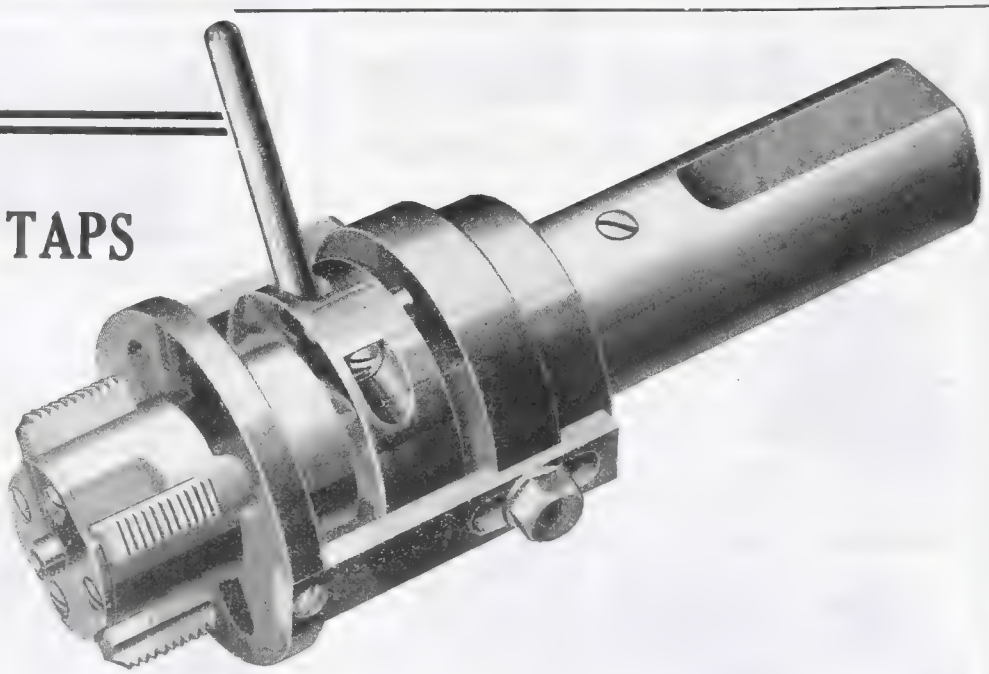

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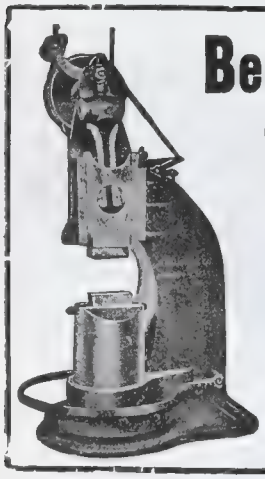

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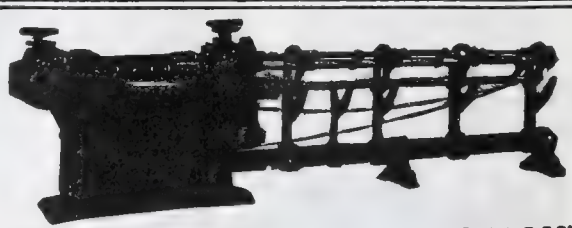

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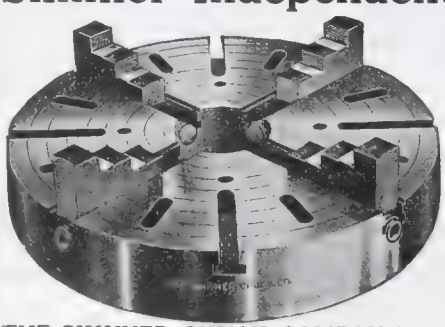

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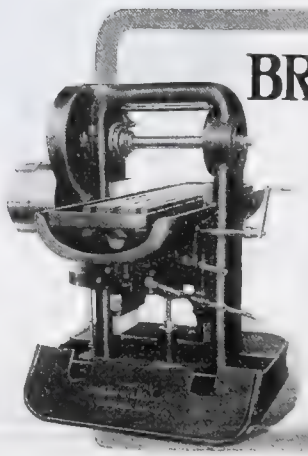

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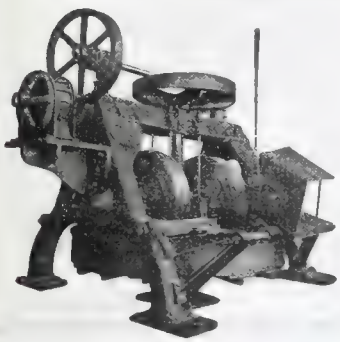

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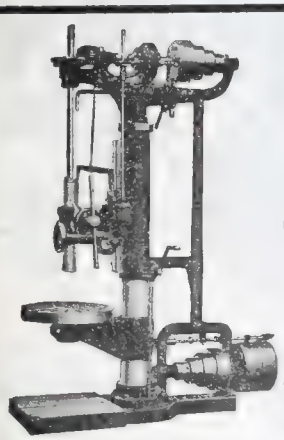

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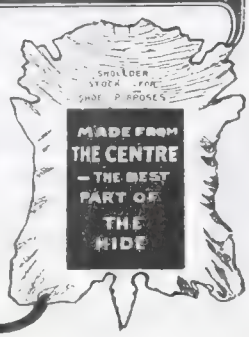

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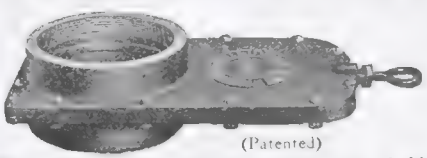

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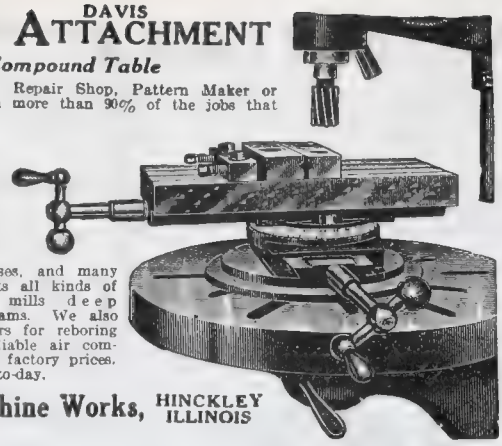

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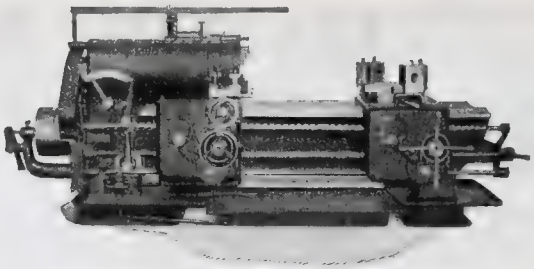

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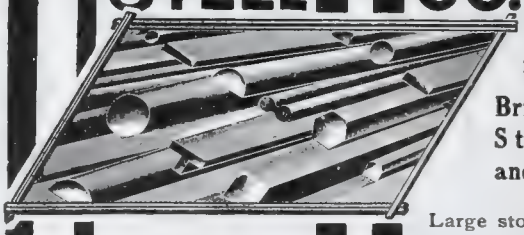

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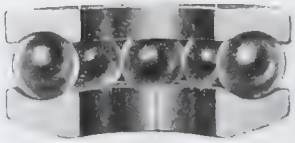

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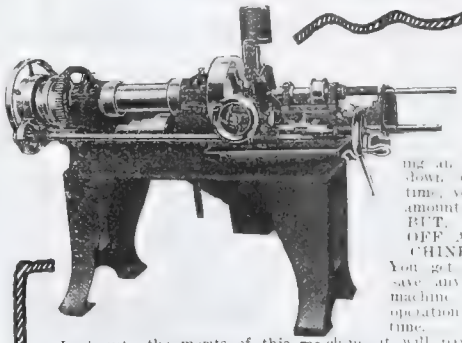

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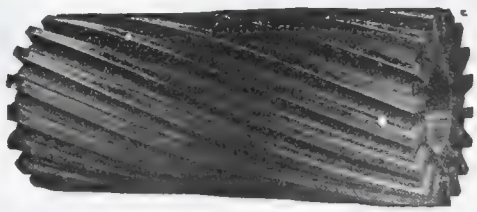

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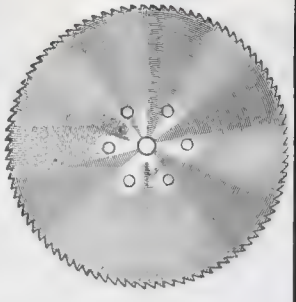

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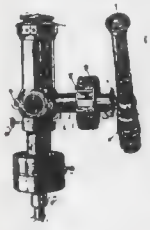

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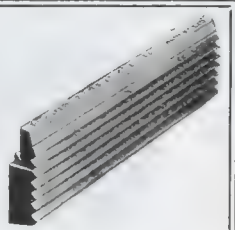

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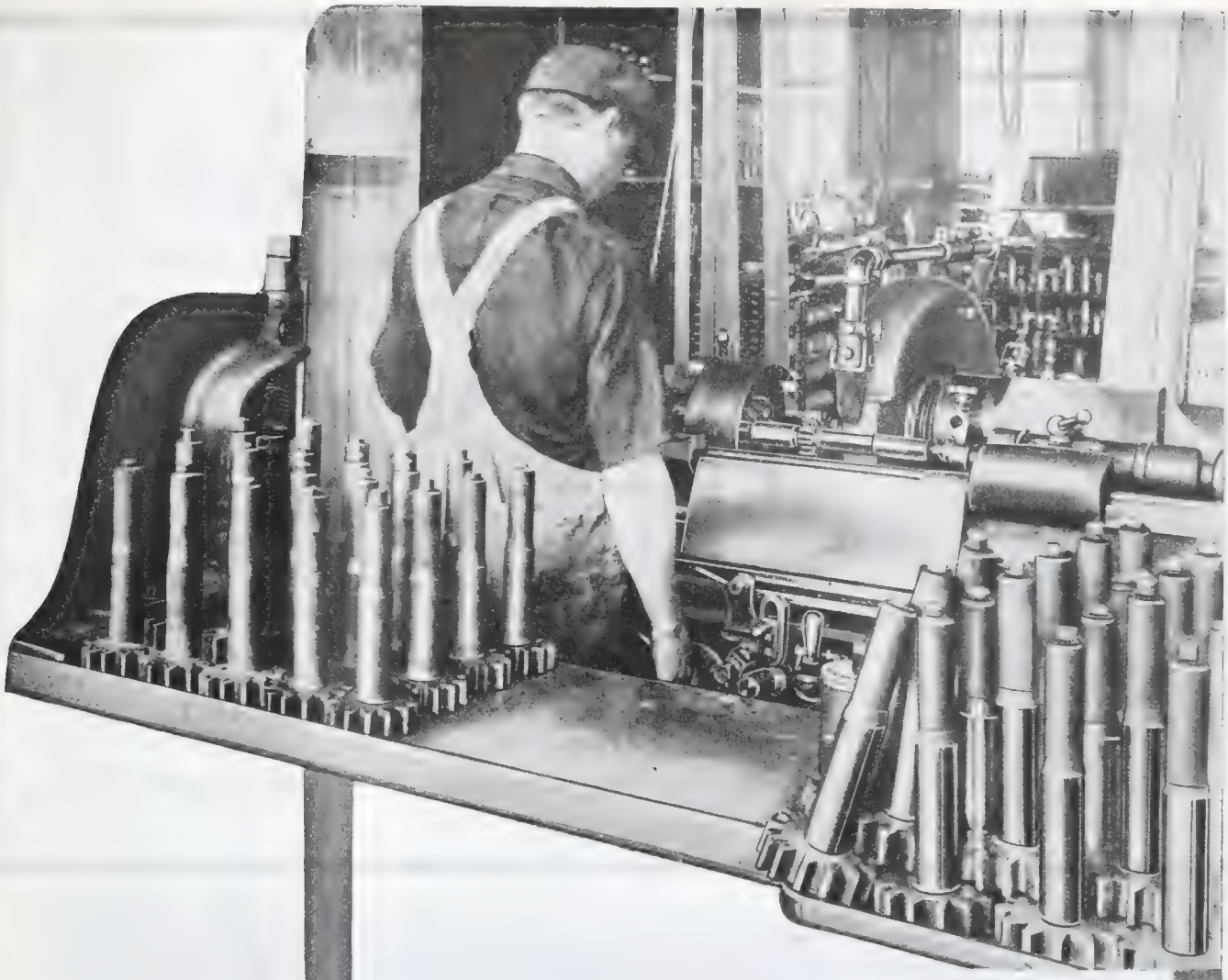

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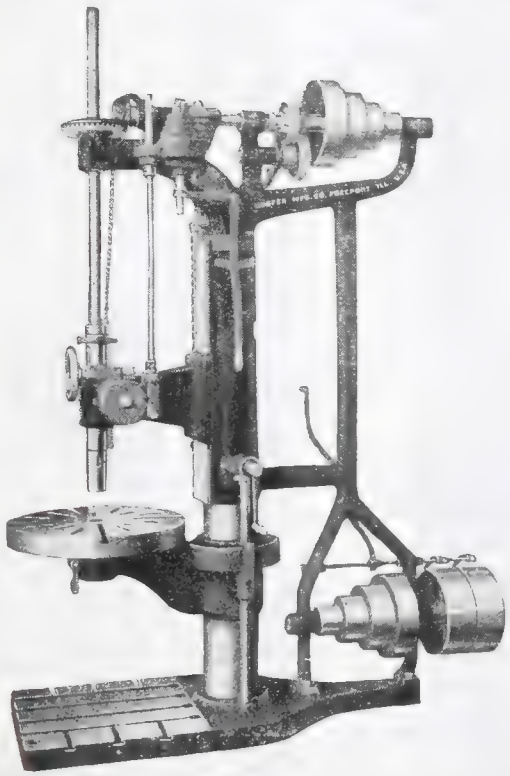

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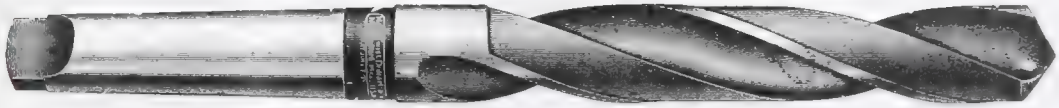

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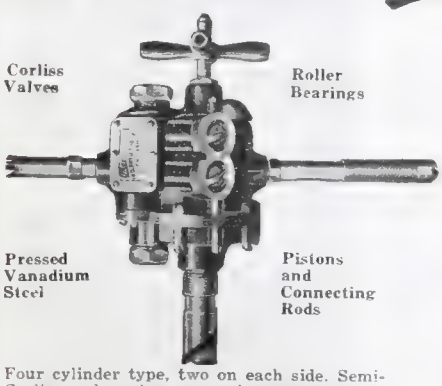

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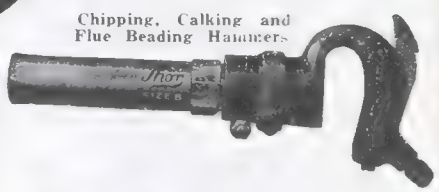

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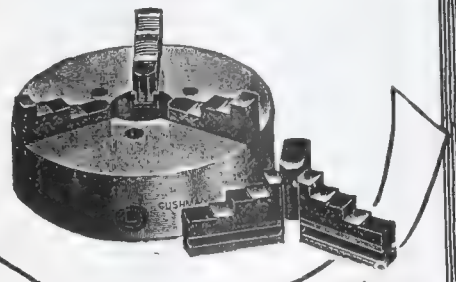

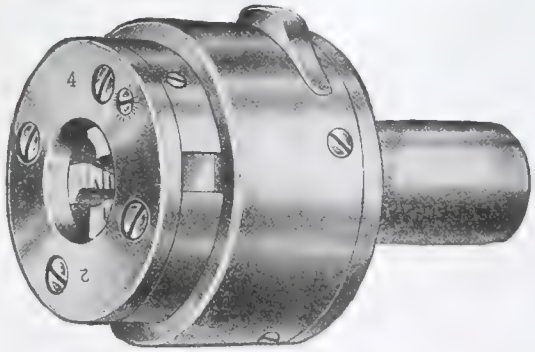

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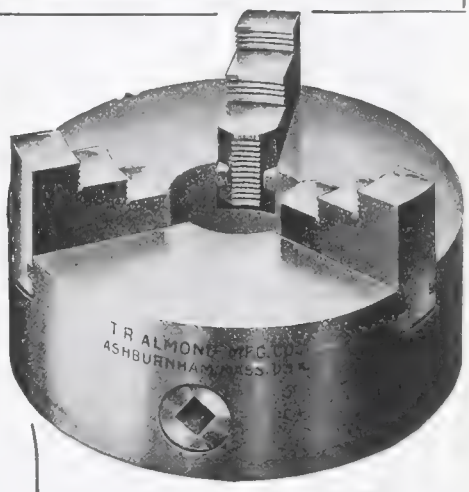

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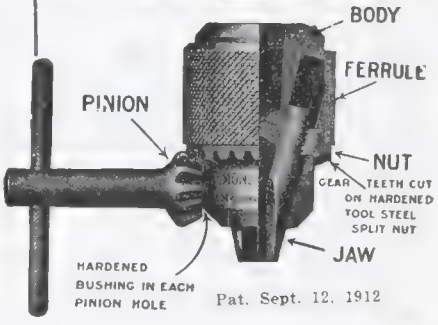

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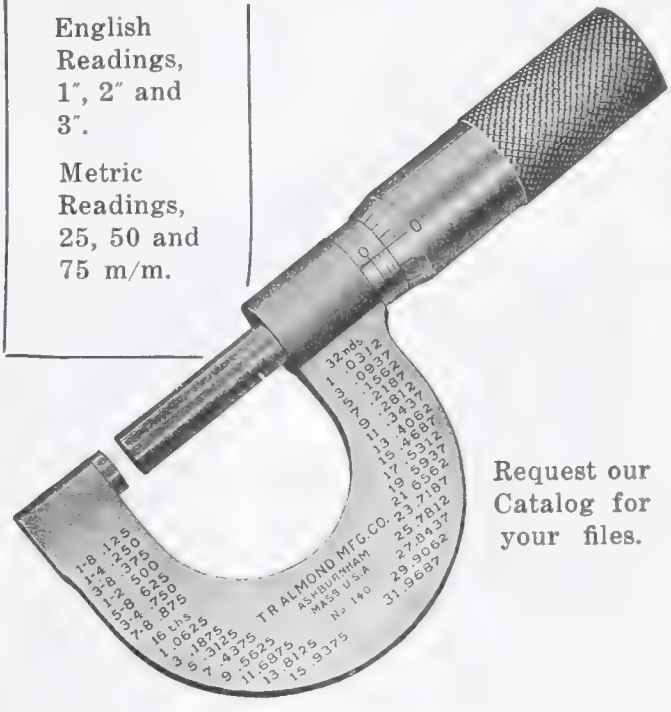

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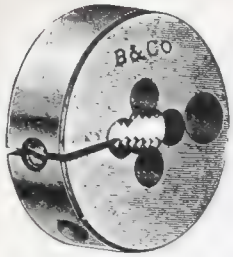

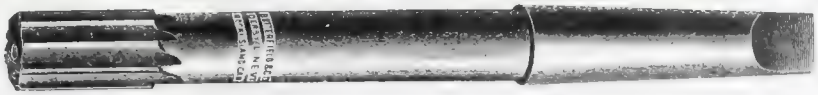

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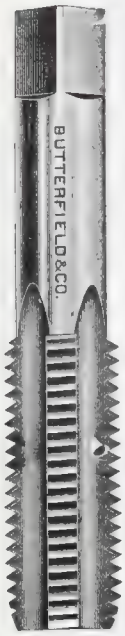

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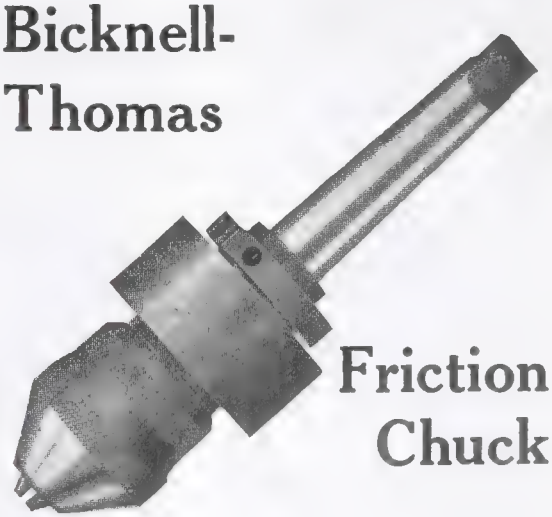

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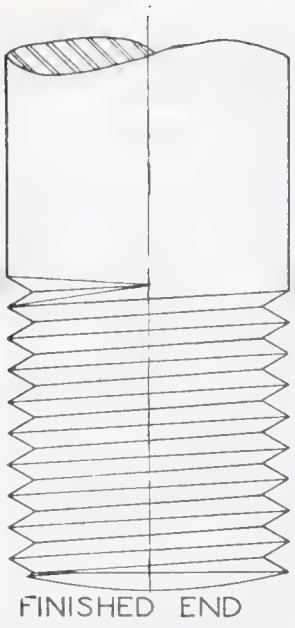

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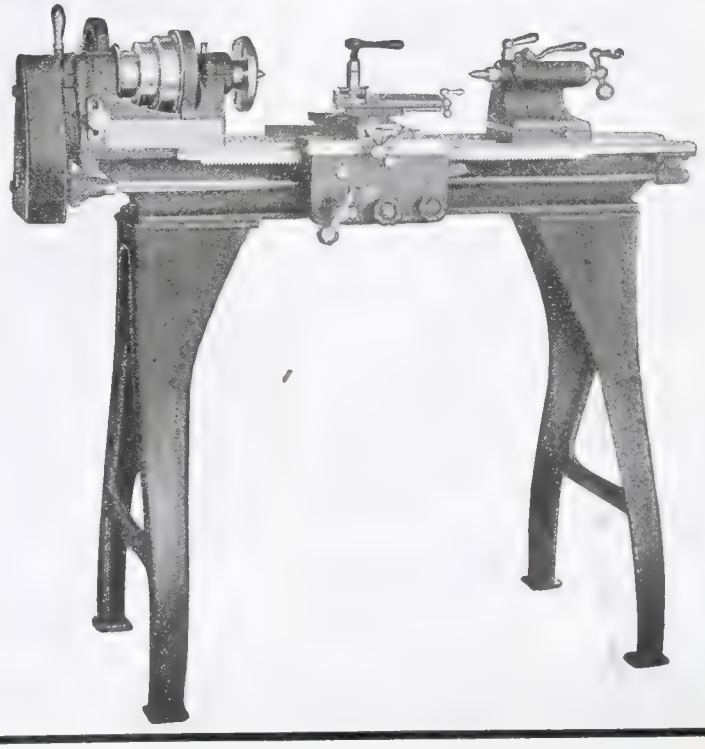

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

LATHES, SPINNING
Bliss, E. W., Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LATHES, TOOL ROOM
Cisco Machine Tool Co., Cincinnati, Ohio.
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LATHES, TURRET, HAND, HORIZONTAL
Acme Machine Tool Co., Cincinnati, Ohio.
Bertram John, & Sons Co. Dundas Ont.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
H. C. Dodge, Inc., Boston, Mass.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co. Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hardinge Bros., Inc., Chicago, Ill.
Hepburn, John T., Ltd., Toronto.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio
Mullmer-Enlund Tool Co., Syracuse, N.Y.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Limited, Montreal, Que.

LEAD BURNING
St. Lawrence Welding Co., Montreal, Que.

LEATHER STRAPPING
Graton & Knight Mfg. Co., Worcester, Mass.

LENSES FOR GOGGLES
Standard Optical Co., Geneva, N.Y.

LIDS, SCREW TOP AND HINGE
Can. Winkley Co., Ltd., Windsor Ont.

LIFTS, PNEUMATIC
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

LINK BELTING
Can. Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Limited, Montreal, Que.

LINOLEUM MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

LOADERS, WAGON AND TRUCK
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Limited, Montreal, Que.

LOCKERS, STEEL WARDROBE AND STEEL MATERIAL
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ontario.

LUBRICANTS
Cataract Refining & Mfg. Co., Toronto.

LUBRICATING, OIL FILTERING AND CIRCULATING SYSTEMS
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

LUBRICATORS
Trahern Pump Co., Rockford, Ill.

LUMBERMEN'S TOOLS
The Thos. Pink Co., Ltd., Pembroke, Ont.

MACHINE COUNTER WEIGHTS
Katie Foundry, Galt, Ont.

MACHINERY, CORNER AND BENDING
Peck, Stow & Wilcox Co., Southington, Conn.

MILLING ARBORS
Kearney & Trecker Co., Milwaukee, Wis.

MACHINERY DEALERS
Archibald & Co., Chas. P., Montreal, Que.
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
The Geo. N. Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINERY, HAMMER AND NAIL
Garlock-Walker Machinery Co., Toronto, Ont.

MACHINERY GUARDS (SEE GUARDS)

MACHINERY REPAIRS
Marten Mach. Co., Hamilton, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINERY, MULTI-DRILLING
National Automatic Tool Co., Richmond, Ind.

MACHINERY, TRANSMISSION (POWER)
Morse Chain Co., Ithaca, New York.

MACHINES, BELT-LACING
Clipper Belt Lacer Co., Grand Rapids, Mich.

MACHINES, RUNNING, BALANCING
Norton Grinding Co., Worcester, Mass.

MACHINES, MULTI-BORING
National Automatic Tool Co., Richmond, Ind.

MACHINE SHOP WORK
James Ballantyne, Montreal.

MACHINISTS' SCALES, SMALL TOOLS AND SUPPLIES
Can. Fairbanks-Morse Co., Montreal.
Marten Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
MacGovern & Co., Montreal, Que.
Starrett Co., L. S., Athol, Mass.
J. H Williams & Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MACHINE TOOLS
Williams & Wilson, Limited, Montreal, Que.

MACHINE & REPETITION WORK
Katie Foundry, Ltd., Galt, Ont.

MANDRELS
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

MARKING DEVICES
Pritchard-Andrews Co. of Canada, Ottawa, Ont.
Matthews, Jas. H., & Co., Pittsburgh, Pa.

MARKING MACHINERY
Brown, Boggs Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Perrin, Wm. R., Toronto.
Williams & Wilson, Limited, Montreal, Que.

MASKS, WELDING,SMOKE, FUME, GAS, ETC.
Strong, Kennard & Nutt Co., Cleveland, Ohio

MEASURING MACHINES
Pratt & Whitney Co., Dundas, Ont.

MEASURES, REGISTERING
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

MEASURING TAPES AND RULES
James Chesterman & Co., Ltd., Sheffield, Eng.

METALLURGISTS
Toronto Testing Laboratory, Ltd., Toronto.

METAL SAWS
Simonds Mfg. Co., Fitchburg, Mass.

METALS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
Canada Metal Co., Toronto, Ont.
Dom. Iron & Wrecking Co., Ltd., Montreal, Que.
Enushevsky & Son, B., Toronto, Ont.
International Metal & Trading Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
United Brass & Lead Ltd., Toronto.

METAL STAMPINGS, SMALL
Can. Winkley Co., Ltd., Windsor, Ont.

METERS
Can. Cartridge Co., Hamilton, Ont.

METERS, WATER
Can. Cartridge Co., Hamilton, Ont.

METERS, OIL, GASOLINE, KEROSENE, ETC.
Bowser & Co., Inc., S. F., Toronto, Ont.

MICROMETERS
Almond Mfg. Co., T. R., Ashburnham, Mass.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que

MILLS, SAND
Frost Mfg. Co., Chicago, Ill.

MILL MACHINERY
Alexander Fleck, Ltd., Ottawa.
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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Bertram, John, & Sons Co., Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, AUTOMATIC
Bilton Mach. Tool Co., Bridgeport, Conn.
Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.

MILLING CUTTERS
Cleveland Milling Machine Co., Cleveland, O.
Kearney & Trecker Co., Milwaukee, Wis.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, HAND
Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
The Gray Ball Bearing Co., Ltd., Toronto.
United States Mach. Tool Co., Cincinnati, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co, Boston, Mass.
Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co, New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
Williams & Wilson, Limited, Montreal, Que.

MINE CARS
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Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

MINING MACHINERY
Can. Fairbanks-Morse Co., Montreal.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que

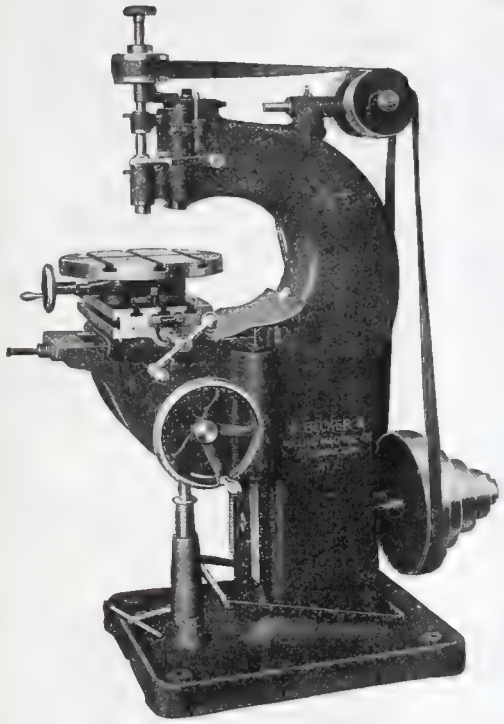
MIXERS, SAND
Frost Mfg. Co., Chicago, Ill.

MODEL WORK
Windsor Mach. & Tool Co., Windsor, Ont.

MORTISING MACHINES
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
The Gray Ball Bearing Co., Ltd., Toronto.

MOTORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal Que

MILLING EFFICIENCY



The after-war competition requires absolute elimination of waste by manufacturers who would succeed. Costly machining must be replaced by economical methods and in no way can you reduce costs so quickly, so well and so completely as by employing

BECKER
BELT DRIVEN
MILLERS

The Model 2 Miller, shown here, is one of the machines that make for inexpensive milling. It is inexpensive not only because it is a production tool of high calibre, but because the initial investment is low. It is so perfectly made and so accurately assembled, that the maintenance is practically nil.

In the last analysis—the "Becker" is efficient.

Write for circular 0-504—now.

BECKER MILLING MACHINE CO.
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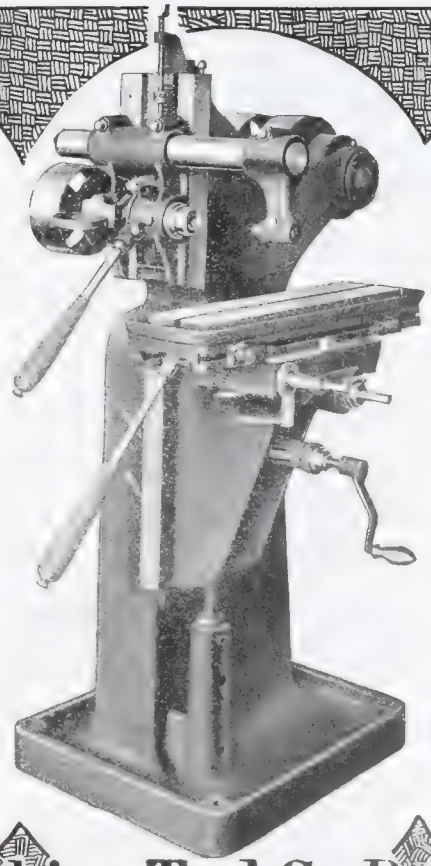
Extensively used in the manufacture of small parts where accurate duplication is essential. Illustration shows our number 1 Heavy Type Hand Miller.

Specially designed for use on work where heavier machine than standard type is necessary.

BRISTOL



Convenience Assures Big Production

The lever controls make a very convenient method of operation, though crank is furnished for table feed for use when so desired.

Users acknowledge these machines to be exceptional producers, proving in many cases more satisfactory than milling machines of the more expensive type.

Write for catalogue.

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Pritchard-Andrews Co., Ottawa, Ont.

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Can. Driver-Harris Co., Ltd., Walkerville, Ont.

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Kayser-Ellison & Co., Ltd., Montreal.
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Wilkinson & Kompass, Hamilton, Ont.

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NUT MACHINES (HOT)
National Machy. Co., Tiffin, Ohio.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Limited, Montreal, Que.

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Sheldon's, Ltd., Galt, Ont.

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St. Lawrence Welding Co., Montreal, Que.
Welding & Supplies Co., Montreal, Que.

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Prest-O-Lite Co., Inc., Toronto, Ont.

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PACKINGS, LEATHER, HYDRAULICS, ETC.
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Graton & Knight Mfg. Co., Worcester, Mass.
William R. Perrin, Ltd., Toronto.

PANS, WET AND DRY
Frost Mfg. Co., Chicago, Ill.

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Bertrams, Ltd., Edinburgh, Scotland.
MacKinnon Steel Co., Sherbrooke, Que.

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Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Oliver Machinery Co., Grand Rapids, Mich.

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Oliver Machinery Co., Grand Rapids, Mich.

PATTERN SHOP SUPPLIES
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Ridout & Maybee, Toronto.
Dominion Pattern Works, Toronto, Ont.
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Greenleaf, Ltd., Belleville, Ont.
Marton Machine Co., Hamilton, Ont.

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Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

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Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.

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Clipper Belt Lacer Co., Grand Rapids, Mich.

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International Malleable Iron Co., Guelph, Ont.

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Butterfield & Co., Rock Island, Que.
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Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Wells Bros. Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
A. B. Williams Machy. Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

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PIERCING
Oliver Machinery Co., Grand Rapids, Mich.

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Curtis & Curtis Co., Bridgeport, Conn.
Greenfield Tap & Die Corp., Greenfield, Mass.
John H. Hall & Sons, Ltd., Brantford, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE CUTTERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE REAMERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE STOCKS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE THREADERS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE TAPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE VISES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

PIPE WRENCHES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

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General Steel Co., Milwaukee, Wis.

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National Acme Co., Windsor, Vt.

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Armstrong Bros. Tool Co., Chicago.

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John Bertram & Sons Co., Dundas.
Oliver Machinery Co., Grand Rapids, Mich.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
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Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
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The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Niles-Bement-Pond Co., New York.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

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Williams & Wilson, Limited, Montreal, Que.

POWER HAMMERS
Quickwork Co., St. Marys, Ohio.

POWER TRANSMISSION MACHINERY
Williams & Wilson, Limited, Montreal, Que.

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Sheldons, Ltd., Galt, Ont.
MacGovern & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.

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Canadian Billings & Spencer, Ltd., Welland.
Peck, Stow & Wilcox Co., Southington, Conn.
Rice Lewis & Son, Toronto, Ont.

POWER CRANES, HAND
MacKinnon Steel Co., Sherbrooke, Quebec.

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Ford-Smith Machine Co., Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Metalwood Mfg. Co., Detroit, Mich.
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E. W. Bliss Co., Brooklyn, N.Y.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.

PRESSES, CAM, TOGGLE, EYELET
Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.

PRESSES FOR SHELLS
Atlas Press Co., Kalamazoo, Mich.
Bliss Co., E. W., Brooklyn, N.Y.
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WILSON FEARED THE BRITISH

THE American President crossed the Atlantic in the first place with the idea in his mind that his ideals would be thoroughly in accord with those of the French statesmen; but he was rather afraid of a conflict with the British delegates. He found in reality that his plan for peace terms was as far removed from the French plan as the two poles. Then he crossed to London and was surprised to find that the ideas of the two Anglo-Saxon powers were identical.

This situation, according to J. W. Dafoe in the May issue of MACLEAN'S MAGAZINE, explains much that has developed at Versailles. Further, it contains the promise of a close *rapprochement* between the two great English-speaking democracies for all time to come.

Mr. Dafoe has contributed a remarkably interesting article to this number of MACLEAN'S, lifting the curtain on many of the puzzling situations that have arisen overseas. As the editor of the Manitoba *Free Press*, he is the dean of Canadian newspapermen; as the representative of the department of Public Information on the Canadian Mission to the Peace Conference, he was in a special position to learn what was transpiring. He tells of the really big part that Canada has played in the Proceedings and points out that Canada's status as a nation was firmly established in the eyes of the world when she was allowed separate representation.

A Dozen Other Features---Nationally Important

This May issue is full of articles of unusual significance for Canadian readers.

"SOLVING THE PROBLEM OF THE ARCTIC"
—By Vilhjalmur Stefansson

The second instalment of his remarkable story of the four years of exploration that he undertook for the Canadian Government in the region of the "Pole of Inaccessibility"—a harder place to reach than the North Pole.

"ORGANIZING FOR PEACE"
—By George Pearson

An article of the Great War Veterans' Association by a well-known author-soldier.

"THE CANADIANS IN SIBERIA"
—By Capt. W. E. Dunham

A graphic story of what our forces did in combatting the Bolsheviki, by an officer who has just returned.

"SAFE IN THE SADDLE"
—By J. K. Munro

A review of affairs at Ottawa in which the opinion is expressed that Union Government for the time being is safely entrenched.

The National Idea

The articles in this issue of MACLEAN'S reflect the national idea—Canada's part in the Peace Conference, the political situation at Ottawa, the exclusive report of Stefansson's national explorations, the national organization of our returned men, the work of our forces in Siberia. The reader of MACLEAN'S gets a broad idea of what Canada as a whole is doing. The value of this issue— and of all issues —is very great, therefore, from an educational standpoint.
MACLEAN'S is the one magazine that should be selected for young Canadians to read.

Four capital stories by famous authors—W. A. Fraser, Lloyd Osborne, Frederic S. Isham and C. W. Stephens.

The Review of Reviews

An unusually fine array of articles is given in this department, selected from the best in magazines and periodicals the world over. Some of the titles are:

Planned to Destroy British Fleet.
How Mackensen Was Caught.
Events of War Foretold by Stars.
What is Life Like Beyond the Grave?
A High-born Bolshevik.
The New Life in Dry America.
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Jones & Glassco, Montreal, Que
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TRANSMISSION TOWERS
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Wilson & Co., J. C., Belleville, Ont.

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TURNBUCKLES
Canada Foundries & Forgings, Ltd Welland Ont
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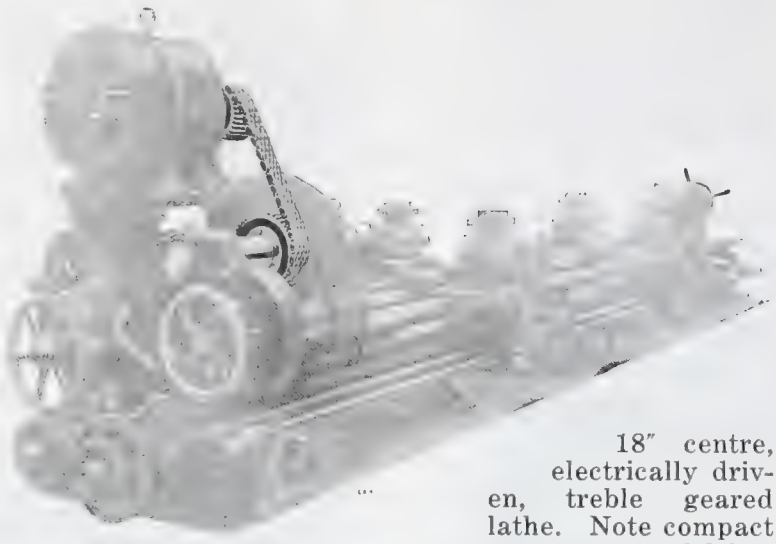

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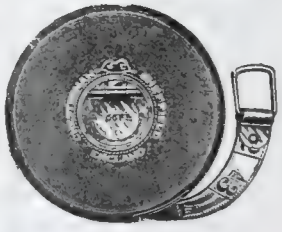

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EDITORIAL CONTENTS

SOME INTERESTING FEATURES OF THE MASSEY-HARRIS BRANTFORD PLANT 509
ARRANGING TRAYS, WRENCH HOLDERS, AND PANS ON MACHINE TOOLS..... 512
SHOP ARITHMETIC—PART V. 514
JIGS, TOOLS AND SPECIAL MACHINES 516
WELDING AND CUTTING 520
WHAT OUR READERS THINK AND DO 522
DEVELOPMENTS IN SHOP EQUIPMENT 524
EDITORIAL 526
MARKET DEVELOPMENTS 528
SELECTED MARKET QUOTATIONS 533
INDUSTRIAL DEVELOPMENTS 535

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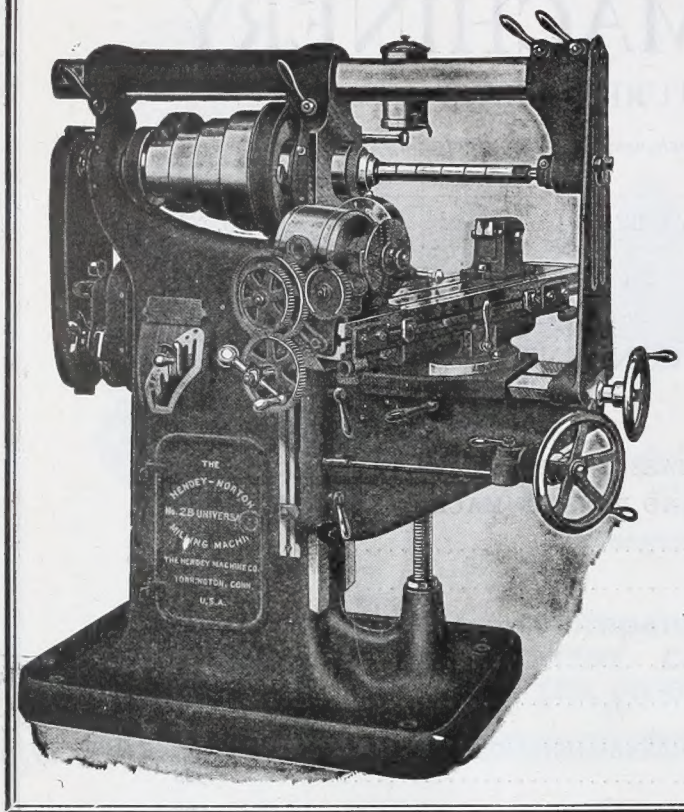

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INDEX TO ADVERTISERS

A

Algoma Steel Corporation 4
Allentown Experimental Works 66
Almond Mfg. Co., T. R. 87
American Pulley Co. 80
Anderson & Co., Geo. 74
Armstrong Bros. Tool Co. 78
Armstrong-Whitworth Co. 9
American Lead Pencil Co. 69

B

Banfield & Sons, W. H. 67
Baird Machine Co. 77
Ballantyne, James 74
Barnes Co., Wallace 65
Beaudry & Co., Inc. 74
Becker Milling Machine Co. 53
Bertram & Sons Co., Ltd. 1
Bristol Machine Tool Co. 93
Bertrams, Ltd. 64
Betts Machine Co. 5
Bicknell-Thomas Co. 89
Blount Co., J. G. 22
Brantford Oven & Rack Co. 94
Bridgeford Mach. & Tool Works... 5
Bristol Company 74
Budden, Hanbury A. 65
Butterfield & Co., Inc. 89
Brockville Foundry Co. 95

C

Can. Cartridge Co. 83
Canada Machinery Corporation ..... Outside back cover
Canada Metal Co. 18
Can. Blower & Forge Co. 1
Can. Driver Harris Co., Ltd. 18
Can. Fairbanks-Morse Co. 5
Can. Foundries & Forgings Co. 13
Can. Ingersoll-Rand Co. 6
Can. Link Belt Co. 17
Can. Steel Foundries 9
Carlyle Johnson Machine Co., The.. 8
Can. Standard Products 67
Cataract Refining Co. 18
Chapman Double Ball Bearing Co... 93
Chesterman & Co., Ltd. 109
Classified Advertising 66
Cleveland Pneumatic Tool Co. 83
Cleveland Wire Spring Co. 67
Consolidated Optical Co. 76
Consolidated Press Co. 26
Coventry Chain Co. 109
Cushman Chuck Co. 87

D

Darling Bros., Ltd. 75
Davidson Mfg. Co., Ltd., The Thos. 61
Davis-Bournonville Co. 77
Diamond Saw & Machine Co. 68
Dom. Foundries & Steel, Ltd. 95
Dunbar Brothers Co. 24

E

Eastern Machine Screw Corp. 87
Electric Steel & Metals Co. 6
Elliott & Whitehall 68
Ellis & Co., P. W. 67

F

Fetherstonhaugh 65
Financial Post of Canada 72
Firth, Thos. 8
Fitchburg Grinding Machine Co. 69
Ford-Smith Machine Co. 10
Foss Machinery & Supply Co., Geo. F. .....Inside back cover
Frost Mfg. Co., The 75
Fry's (London), Ltd. 14

G

Gardner, Robt. 69
Garlock-Walker Machinery Co. 67
Garvin Machine Co. 16
General Steel Co. 6
Geometric Tool Co. 63
Giddings & Lewis Mfg. Co. 77
Gilbert & Barker Mfg. Co. 18
Gisholt Machine Co. 31
Gooley & Edlund, Inc. 74
Grant Gear Works, Inc. 78
Grant Mfg. Co. & Machine Co. 23
Greenfield Machine Co. 75
Greenfield Tap & Die Corp. 27
Greenleafs, Ltd. 64

H

Hamilton Gear Co. 72
Hanna & Co., M. A. 8
Hawkridge Bros. 64
Hendey Machine Co. 104
Hepburn, John T. 11
Hope & Sons of Canada, Henry..... 79
Hinckley Mach. Works 76
Hoefer Mfg. Co. 83
Hoyt Metal Co. 10
Hurlburt-Rogers Machinery Co. 77
Hunter Saw & Machine Co. 78

I

Independent Pneumatic Tool Co. ... 85
Ingersoll File Co., Ltd. 95

J

Jacobs Mfg. Co. 89
Jardine Co., A. B. 13
Johnson Carlyle Machine Co., The.. 8
Joyce-Koebel Co., Inc. 78

K

Katie Foundry Ltd. 69

L

Landis Machine Co. 26
Landis Tool Co. 78
Latrobe Electric Steel Co. 9
Lufkin Rule Co. of Canada..... 65
Lynd-Fairquhar Co. 24

M

MacGovern & Co. 70
MacLean's Magazine 99
Manitoba Steel Co. 76
Marshalltown Mfg. Co. 16
Matthews & Co., Jas. H. 30
Matheson & Co., I. 67
McDougall Co., Ltd., R. 28
Morrow Screw & Nut Co., John.... 95
McLaren Belting Co., J. C. 75
Mechanical Engineering Co. 19
Metalwood Mfg. Co. 78
Morse Twist Drill Co. 85
Morton Mfg. Co. 65
Mulliner, Enlund Tool Co. 28
Murchey Machine & Tool Co. 73

N

National Acme Co. 73
National Automatic Tool Co..... 20
Nicholson File Mfg. Co. 97
Niles-Bement-Pond....Inside front cover
Northern Crane Works..... 75
Norton, A. O. 76
Norton Co., The 39
Norton Grinding Co. 79
Nova Scotia Steel & Coal Co..... 11

O

Oakley & Sons, John 19
Oakley Chemical Co. 77

P

Page Steel Wire Co. 77
Pangborn Corporation 77
Parmenter & Bulloch Co. 78
Peerless Machine Co. 30
Plewes, Ltd. 64
Positive Clutch & Pulley Works... 68
Pratt & Whitney.....Inside front cover
Puro Sanitary Drinking Fountain Co. 65
Publisher's Page 2

Q

Quickwork Co. 24

R

Racine Tool & Machine Co. 14
Ridout & Maybee 65
Rochester Ball Bearing Co. 76
Rockford Drilling Machine Co. 21
Rockwell Co., W. S. 75
Roelofson Machine & Tool Co..... 29

S

Seneca Falls Mfg. Co. 91
Shipman & Co., H. C. 65
Shore Instrument Co. 78
Shuster Co., F. B. 74
Silver Mfg. Co. 75
Simonds Canada Saw Co. 14
Skinner Chuck Co. 74
Smalley-General Co., Inc. 91
Smith, N. 65
Standard Fuel Engineering Co. ... 19
Starrett Co., L. S. 15
Steel Co. of Canada 3
Steinle Turret Machine Co. 76
St. Lawrence Welding Co., Ltd. 59
Stoll Co., D. H. 74
Strong, Kennard & Nutt Co., The 78
Swedish Crucible Steel Co. of Can. 76
Swedish Steel & Importing Co..... 12

T

Tabor Mfg. Co. 77
Taylor Instrument Co. 21
Trahern Pump Co. 11

U

Union Carbide Co. 23
Union Drawn Steel Co. 76
Union Mfg. Co. 70
Universal Grinding Machine Co.... 68

V

Vanadium-Alloys Steel Co. 12
Victoria Foundry Co. 68
Vulcan Crucible Steel Co. 12

W

Welding & Supplies Co. 77
Wells Bros. Co. of Canada 27
Wheel Trueing Tool Co. 75
Whitman & Barnes Mfg. Co. 23
Wilkinson & Kompass 77
Williams Machinery Co., Ltd., A. R. Front cover, 61
Williams & Co., J. H. 97
Wilson, T. A. 78
Wilson & Co., J. C. 61
Wilt Twist Drill Co. 7
Windsor Machine & Tool Works..... 68
Wood Turret Mach. Co. 22
Wright Mfg. Co. 25

Z

Zenith Coal & Steel Products 65

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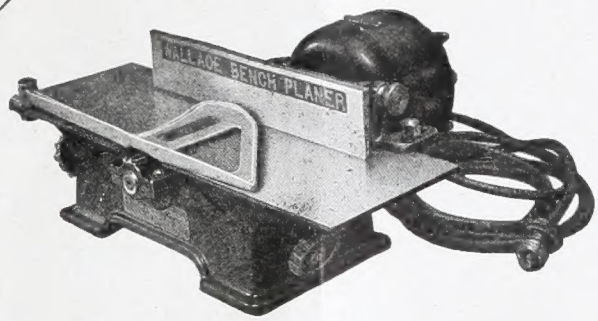

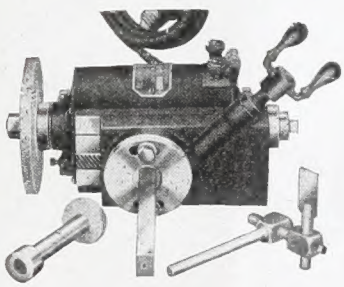

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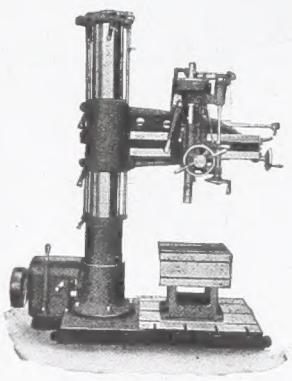

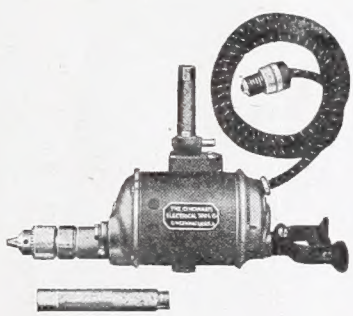

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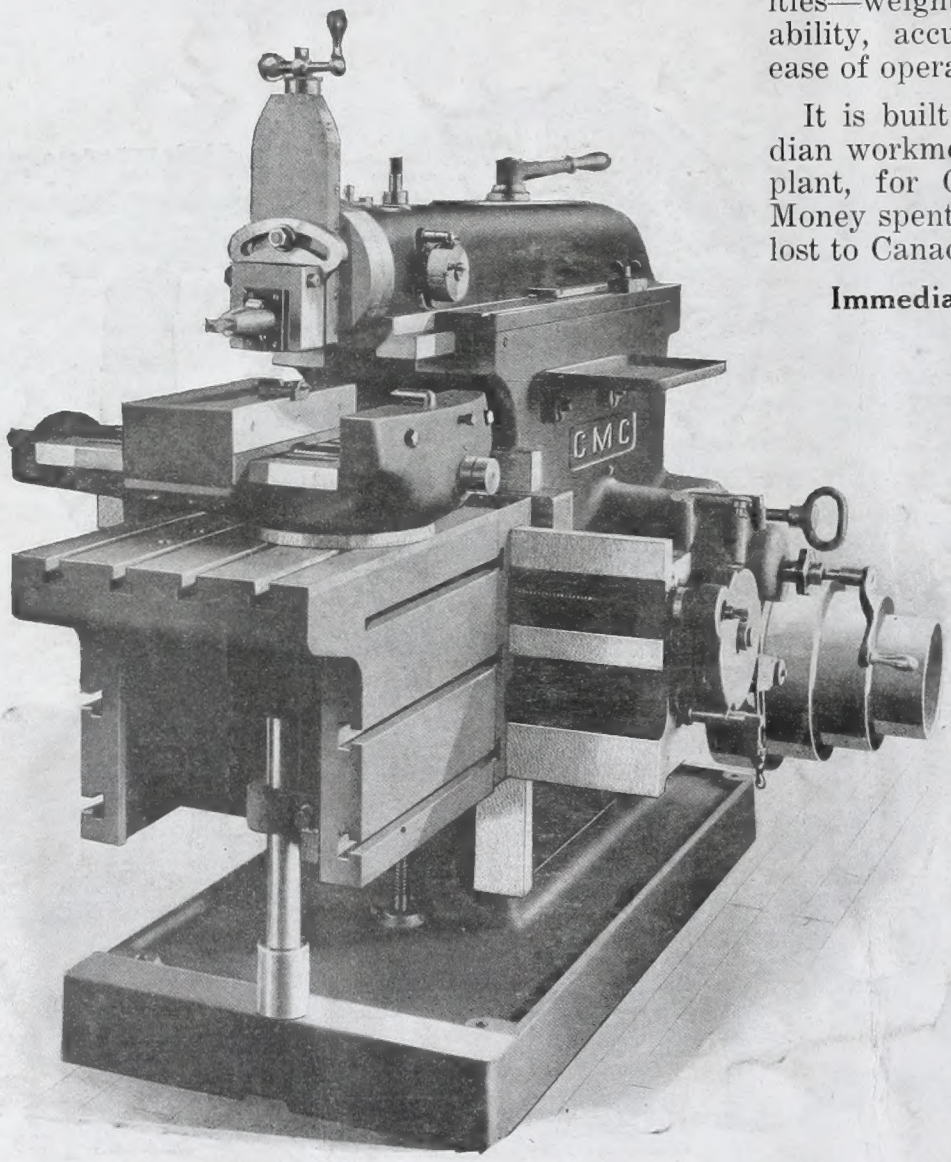

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